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THE
ASIATIC SOCIETY OF BOMBAY
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MEMOIRS

OF

AGRICULTURE, &c.

RESOLUTION of the Society for the Encouragement of Arts, Manufactures, and Commerce, June 7, 1767.

"*The Society for the Encouragement of Arts, Manufactures, and Commerce, will occaſionally publiſh in this Work ſuch Pieces as they ſhall think proper to lay before the Public.*"

N. B. The SECOND VOLUME of this work will be publiſhed in *February* or *March* next: and ſuch Gentlemen as are diſpoſed to favour the Editor with any communications reſpecting improvements in Agriculture, or other uſeful matters, are requeſted to ſend them to Mr. NOURSE, Bookſeller to His MAJESTY.

MEMOIRS

OF

AGRICULTURE,

AND OTHER

OECONOMICAL ARTS.

BY

88493

ROBERT DOSSIE.

VOLUME I.

LONDON,

Printed for J. NOURSE, Bookseller to His MAJESTY.

MDCCLXVIII.

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TO THE

KING.

SIR,

AMONGST the many more important means, by which Your MAJESTY has promoted the intereſt of your ſubjects, and the welfare of mankind, you have been pleaſed to patronize, in a peculiar manner, the Polite Arts; and, alſo, the advancement of Natural Hiſtory, and Mechanics; on which the improvement of Agriculture, and other Oeconomical Arts, principally depends. The fruits of Your MAJESTY's goodneſs, as to theſe points,

have been moſt eminently conſpicuous, in the amazing progreſs, thoſe arts have made in your dominions, ſince the commencement of your auſpicious reign; and in the ſpirit, which now prevails generally, of puſhing them ſtill further towards ultimate perfection.

This ſtriking evidence, of Your MAJESTY'S gracious diſpoſition to countenance ſuch purſuits, has given room to hope, that the proceedings of a Society, inſtituted for the Encouragement of Arts, Manufactures, and Commerce; and whoſe aſſiduous labours, have produced adequate effects; will not be thought wholly unworthy your royal notice: whence I have been emboldened, humbly to beg leave, to lay before Your MAJESTY this Firſt Volume of the Memoirs of Agriculture, and other Oeconomical Arts: a work chiefly calculated to aid the efforts of that Society.

I flatter

I flatter myſelf with the more indulgence from Your MAJESTY, as it contains a brief hiſtory of the Society's tranſactions, from its firſt eſtabliſhment to the end of the year 1767: exhibiting the nature of the ſeveral objects of its encouragement; the reaſons for adopting them; the ſubſequent proceedings, with the reſult; and the probable methods of completing the end, where not hitherto attained.

A long application to the ſtudy of the principles, and the knowledge of the facts, that afford lights into the reſpective ſubjects; together with a conſtant attendance on the Society, and a part in moſt of the tranſactions; inſpired me with the audacity to engage in this difficult taſk: which, as it ſeemed, would have been otherwiſe unattempted; though eſſential to the rendering the Society's endeavours fully effectual, as to many particulars.

Great, as have been my pains, and anxiety, to acquit myſelf well in this undertaking, if my performance ſhould meet with the ſmalleſt ſhare of Your MAJESTY'S approbation, I ſhall think myſelf amply rewarded. At leaſt I confide in Your MAJESTY'S benign candour, that the utility of the deſign will excuſe my want of greater abilities to execute it; and my preſumption, in aſpiring to preſent this volume to Your MAJESTY.

I am, SIR,

Your MAJESTY'S

Moſt dutiful Subject, and

Moſt devoted, humble Servant,

ROBERT DOSSIE.

PREFACE.

THE general great advantages to the public of improvements in agriculture, and other œconomical arts, are too evident to require any demonſtration from argument. But there are reaſons for our earneſt attention to them, peculiar to the preſent times, which cannot be too ſtrongly and univerſally inculcated.—The high price of all kinds of proviſions, and the decline of our manufactures, are become affecting objects of the moſt ſerious conſideration: as not only the welfare of numbers of individuals, but the flouriſhing condition of the ſtate, and perhaps even our very exiſtence as a free people, depend in ſome manner on them.—Under theſe alarming circumſtances, we have, however, this conſolation, that at the period when it is ſo neceſſary for us to uſe every poſſible means to check the progreſs of theſe evils, ſome events have taken place, which give us great room to hope for a future remedy, and ſecurity againſt them. — An extraordinary taſte and fondneſs

fondneſs has happily ariſen, not only in many gentlemen of independent fortunes, but even in opulent perſons in profeſſions, and trade, for applying to the advancement of huſbandry, and other uſeful arts: and ſuch a ſpirit ſubſiſts in numbers of them, as ſuffers neither aſſiduity nor expence to be wanting, to puſh experimental diſquiſition to the utmoſt extent. Among thoſe, alſo, who do not actually engage in the practical part of theſe purſuits, we ſee many ſtriving with equal ardour to promote this important end in a different way: that is, by furniſhing incitements to others to employ their utmoſt efforts to make beneficial diſcoveries, or to reveal for the common good, ſuch as are already made.

The public-ſpirited plan of the Society, inſtituted in London for the encouragement of arts, manufactures, and commerce, though the principal, and a very eminent inſtance of this diſpoſition, is not the only one, which has been carried into execution.—There are ſeveral country ſocieties formed in an humbler way, to proſecute the ſame noble views: and which endeavour, in a ſimilar manner, to increaſe or diffuſe uſeful knowledge of the reſpective ſubjects. And, beſides what is done by theſe collective bodies, many individuals ſtrenuouſly exert themſelves, in a private capacity, to cheriſh

riſh invention, and propagate intelligence in matters of this nature.

But vain are all theſe labours to cultivate experimental reſearch, or collect information, if a proper channel be wanting to tranſmit the produce of them to the public; and convey it to thoſe, for whoſe emolument it was intended.

Without this means, no fruit can be reaped from all thoſe pains. It is to little purpoſe, that the encouragers of theſe improvements amaſs together all the intelligence in the world, if they only bury it in their own records and papers, where it ſoon falls into oblivion; or confine the effects of it to ſome particular perſons or places, where its narrow influence can be but of little moment. This is, in fact, to waſte time and money improvidently, not to ſay irrationally, in attaining thoſe means of being ſerviceable to the public, which are not afterwards to be applied to any real end.

With regard to the London Society, the defect of ſuch an opportunity of completing their purpoſes, is not the conſequence, either of ignorance of its efficacy, or inattention to the procuring it; but of unlucky accidents, that have fallen in their way, and fruſtrated their views as to this point. It was, for ſome years, their

their declared intention, to have publiſhed, annually, an hiſtorical regiſter: in which, the communications procured by their *premiums*, or made to them by ſpontaneous correſpondents, were to have been given to the world. But ſeveral unforeſeen difficulties prevented the putting this deſign in execution; and have, at length, ſo much evinced it not to be practicable with convenience, that they ſeem at preſent to have laid aſide all thoughts of it. Some ſubſtitutive method of doing the ſame thing, is, therefore, abſolutely neceſſary to render effectual their proceedings; eſpecially as experience has now ſhewn, that one of the beſt ways to advance agriculture, by means of their premiums, is to require not only the matter propoſed ſhould be done, but that information ſhould be given, alſo, by the claimant, of the manner in which it was done; and of all the attendant circumſtances, that may conduce to enable others to do the ſame. The importance of this kind of information is, indeed, ſo evident, that the Society, in a number of inſtances, offer their medals, which are eſteemed the higheſt reward they can beſtow, only for intelligence of the beſt methods of performance of the matter propoſed, verified by experiments, without exacting any other taſk from the candidate. Theſe are certainly very right meaſures to procure the deſired knowledge: but ſuch knowledge can never be rendered

dered of any material ſervice to the world, till the publication of ſome proper periodical work furniſhes the opportunity of promulging it for general uſe. This work ſhould be ſuch, as may be open to receive all the reſpective communications; and become the known repoſitory of them: in which they may be always found; and to which any, who ſhall have occaſion for them, may eaſily have recourſe.

It is to be regretted, as well on the ſcore of the public, as for the ſake of the Society itſelf, which has not, for this reaſon, acquired the whole honour due to it on many occaſions, that no ſuch work has been hitherto eſtabliſhed with their concurrence. In default of the publication of their hiſtorical regiſter, a monthly periodical collection of eſſays and letters on agriculture, and commercial arts, was ſet up, without any connection with them, under the name of *Muſæum ruſticum, & commerciale*; as a vehicle for all communications of this nature. The favourable reception, and ſupport, that it met with, manifeſted the ſenſe, which the world entertained of the expedience of ſuch a work: and though it was not, in the earlier part of its duration, ſupplied with ſufficient matter of adequate conſequence; yet perhaps few circumſtances in the preſent times have more contributed to create, and diſſeminate the taſte for purſuits

purſuits of this kind, or more aſſiſted to the proſecuting them by the beſt methods, than that publication. But ſome occurrences reſpecting the œconomical management of it, and not any neglect or diſcouragement on the part of the public, occaſioned the diſcontinuance of it above two years ago: and left thoſe, who apply themſelves to the ſtudy or practice of agriculture, without any means of calling for the aid of inſtruction to get over the difficulties they may meet with; or of imparting, in a general way, what they believe may be advantageous for others to learn.

The above-mentioned reaſons gave riſe to a deſign of ſetting on foot a work adapted to theſe views; but more extenſive than had been hitherto attempted. In order that the ſeveral Societies, particularly that of London, may have an opportunity of giving the world the benefit of their labours; and that the means may be reſtored, by which private individuals may diſcloſe the reſult of their experiments, or obſervations to the public; or procure intelligence from others, on any points where it may be material to themſelves, or their neighbours.

There are ſome other circumſtances relative to modern improvements, that afforded ſtill further inducements to the publiſhing this work, on

on account of the national good, to which it may be made ſubſervient. The example of Great-Britain, and Ireland, has been followed by ſeveral other countries on the continent: and there are now a number of ſocieties, and academies, in various places, that are inſtituted on the ſame ſyſtem; and follow the ſame general methods of proceeding; except, that the greateſt part publiſh ſome kind of *memoirs*, or *journal* of their own tranſactions, or the correſpondence of private perſons with them on the objects of their purſuit. Moſt of theſe works are ſent to, or otherwiſe procured by the Society in London: but the community has hitherto had very little advantage from the contents of them: except that a tranſlation of ſome ſelected pieces was publiſhed three or four years ago. It is not to be imagined, that the whole contained in theſe foreign memoirs, or journals merit notice here, where arts, as well as ſcience, have made a much greater progreſs towards perfection. But ſeveral of the articles in them being communicated by very ingenious and philoſophic men, who have applied themſelves to experimental examination, as well as abſtracted ſtudy, they of courſe ſometimes furniſh new, and important lights. Moreover, notwithſtanding we enjoy a ſuperiority in general over other countries, in the improvement of moſt arts, yet particular places elſewhere

poſſeſs certain matters of great utility, peculiar to themſelves, of which the intelligence has not hitherto reached us: at leaſt not in ſo full a manner as to make us practically maſters of them. Some of the contents, therefore, of theſe foreign works are well worthy our attention, both with regard to ſpeculation, and practice; ſince they may entertain us by their novelty, while we profit by their inſtruction. The extracting, conſequently, from time to time, the valuable part of the eſſays, publiſhed by foreign ſocieties, and academies; and giving it in our own language, with ſuch comments, or illuſtrations, as may render it more applicable to uſe with us; cannot fail to have an eſſential tendency to the improvements we are cultivating.

There is yet another ſource of information relating to agriculture, that ſhould not eſcape our notice. It is, the reports made, from year to year, by Mr. Wynne Baker, of the effects of his trials and experiments; which are performed under the protection, and with the ſupport of the Dublin Society; and conducted by him with ingenuity, and judgment. Though theſe reports are publiſhed by Mr. Baker in Ireland; yet they come to the hands of very few here: but, by their being inſerted in this work, the public may reap the full advantage of them: as

they

they will be thence laid open to all, who may wiſh to peruſe them.

Theſe are the preſent views, on which the intention of publiſhing this work was formed. The Society for the Encouragement of Arts, &c. were properly apprized of the plan of it: and they were pleaſed to make the following reſolution.

June 17, 1767.

Reſolved,

"That, if the propoſal for ſetting on foot a "periodical work, under the title of *Memoirs of* "*Agriculture, and other Œconomical Arts, &c.* be "carried into execution, the Society will occa- "ſionally publiſh in it ſuch pieces relating to "agriculture, manufactures, and commerce, "as they may think proper to lay before the "public. And that liberty be hereby given, "to ſpecify the ſenſe of this reſolution in the "title-page, and adverti ſements of the ſaid "work, in the following words:—*The Society for* "*the Encouragement of Arts, Manufactures, and Com-* "*merce, will occaſionally publiſh, in this work, ſuch* "*pieces, as they ſhall think proper to lay before the* "*public.*"

But, beſides the communications, which the Society itſelf may, in conſequence of the above

reſolution, direct to be inſerted in this work, it is intended to ſubjoin to them every other ſpecies of information, that may contribute to promote its final views. The earlieſt account will be preſented of all the future premiums, they ſhall reſolve to offer: and ſuch explanations will be added, as may tend to render the moſt efficacious. A liſt will be, likewiſe, given, with the ſame comments, of thoſe, which at preſent ſtand ſubject to claims in the next or any ſucceeding year. This will be highly conducive to the ſucceſs of theſe premiums. For, in order to make them fully effectual, it is neceſſary, that the nature of the ſubject, the reaſons on which the utility is preſumed, and the moſt feaſible methods of performing or attempting the matter propoſed, ſhould be as much as poſſible made known. It is obvious from obſervation, that many perſons, who have been paſſive from a ſuppoſed incapacity, would have had the ſpirit to undertake, and perhaps the ability to perform, the taſks required by the Society, if they had well underſtood the end and means: as alſo that many, who have made attempts, have miſcarried from an ignorance of theſe particulars, or from unluckily miſtaking the intention of the Society.

It is a principal part of the deſign of theſe Memoirs, to remove thoſe difficulties, by ſupplying

plying ſuch information, as may encourage the proper perſons to become candidates: and, at the ſame time, facilitate their endeavours to effect the end, by aſſiſting them with intelligence of the beſt means. But this has made it neceſſary to go a ſtep further. It was impoſſible to be explicit, and clear, as to the reaſons, and inſtructions, which regard the ſubjects of the preſent premiums, without retroſpection to ſeveral things paſt. Theſe formed ſo conſiderable a part of the whole ſyſtem of the Society's tranſactions, that it would have been disjointing and mutilating the parts, not to have comprehended the whole, in any diſquiſition reſpecting them. I have, therefore, begun this work with a brief hiſtory of the Society's views, and proceedings, as to every article of encouragement, they have adopted, till the end of the year 1767; and of the ſucceſs, and failure of their endeavours. I have prefixt an explanation of the general nature of the ſubject, and the reaſons for adopting it; and ſubjoined ſuch other remarks on the means of encouragement employed, and on the event of them, as may beſt tend to promote the completion of the views. This will render intelligible many particulars relating to the preſent and future premiums, that would be otherwiſe obſcure and ambiguous; and, at the ſame time, throw a true light on the motives, and acts of the Society which,

through the indiſpenſible brevity of their advertiſements, the neceſſity of adhering ſtrictly to the conditions required in them, and the novelty or complexity of the intention in ſeveral caſes, are, for want of ſuch explanations, ſometimes greatly miſconceived.

The ample collection which the Society has made of *improved machines*, as well for other purpoſes, as thoſe of agriculture, are loſt to the public, in a great degree, till a proper account of them be publiſhed, in ſuch manner, that thoſe, to whom they may be uſeful, may have an opportunity of knowing and procuring them. A catalogue of them will be, therefore, given in this work, with ſuch an explanation of their conſtruction and uſe, as may tend to the introduction of them into general practice; and the beſt application of them to the purpoſes for which they are intended.

All other future occurrences, reſpecting the affairs of the Society, proper for the notice of the public, will be likewiſe related: and ſuch elucidations ſubjoined, as may render the knowledge of them moſt ſerviceable to the world; or advantageous to the intereſt of the Society itſelf. By this aſſiſtance, the operation of the premiums will be greatly aſſiſted: and the views and tranſactions of the Society being

more

more generally known, and better comprehended, it will receive a larger ſhare of the due honour, and credit: which will undoubtedly conduce to its ſtability and flouriſhing ſtate. This alone ſeems wanting to put the Society on the moſt reſpectable footing with the public. For whoever is well acquainted with the great amount of the funds, conſidered as a private ſubſcription; the aſſiduous attendance, and the qualifications of many of the members; and the numerous inſtances of ſucceſs in the very material improvements of agriculture, commerce, and the polite arts; muſt acknowledge the Society to be the moſt illuſtrious example, of this kind, of a liberal, generous, patriotic ſpirit, exerted in adequate abilities for the execution of its noble purpoſes. This declaration of the great ſucceſs of the Society's endeavours may appear exaggerated to ſuch, as have had but little opportunity of knowing the particulars; or have perhaps been prejudiced by thoſe, who are fond of propagating the contrary opinion. But a juſt view of the Society's proceedings will ſhew it to be well founded: and I need only refer to the brief hiſtory of them, which makes the third article of this work: where, by the great multiplicity of inſtances, found in the detail of facts, all, who attend to the peruſal of them muſt be convinced.

In any part of this work where the Society's concerns may come in queſtion, the greateſt care will be taken to diſtinguiſh what is really inſerted by their order, from the other matters which do not paſs through their hands; that no part may be imputed to them but what is publiſhed by their authority, and that they may not be miſtakenly made reſponſible for the productions of a private pen.

There is a collateral circumſtance, alſo, reſpecting in ſome meaſure the Society, from whence this work may become a convenient receptacle of information, both to the correſpondent and the public. In caſes, where premiums are offered for accounts of the beſt methods of doing any matter propoſed, or where the giving ſuch accounts made a part of the conditions, the premiums can only be allotted to thoſe, which are adjudged to have the preference: whereas there may be others, that may be very good; and perhaps even better in ſome particulars, though not in the whole, than thoſe which gained the premium. Where this may happen, the Society cannot, nevertheleſs, with propriety publiſh any of theſe accounts, except thoſe of ſuch of the candidates as have obtained a premium: ſince they have no right to diſpoſe of the reſt. But whenever the other candidates may be deſirous the

world ſhould have the benefit of their labours, a place will, at their requeſt, be afforded to them, in theſe Memoirs, either as ſent by a correſpondent on the common footing, or by one of the Society's candidates, according as they themſelves may chuſe.

The other ſocieties in our own country may avail themſelves various ways of the channel of communication, which this work offers. They may, by aſking it, obtain intelligence of what they find wanting in their own neighbourhood, to put them on a level with others in any particulars: or they may transfer to others a knowledge of the advantages they locally enjoy, or have procured by their efforts. The cauſing experiments, and comparative trials to be made under their own inſpection, for aſcertaining many matters now doubtful, or for gaining original lights, is much more in their power than in that of the London Society: from whom, on the other hand, they may receive hints and inſtructions as to the proper objects and manner of theſe trials. And, in this way of proceeding, they may do great ſervice both to their own neighbourhood, and the world in general. It is almoſt incredible, how much ſcope of this kind there is for the application of comparative trials. Scarcely any of the moſt ſimple, and common points of

practice in huſbandry have been ſettled on demonſtrative principles, founded on the calculation of the effects of various proportions, and methods accurately ſtated, as the very great variety of uſages, and opinions, even in the ſame places, ſhew. Moſt of theſe dubious points might be, nevertheleſs, eaſily determined with a practical certainty, by a proper number of experiments: and it is ſcarcely to be believed, without ſome attention to a computation of theſe matters, what ſavings would accrue to individuals, and conſequently to the public, from having theſe doubts cleared up; and the moſt expedient and profitable methods of practice univerſally known.

The pieces ſelected from the foreign memoirs, and journals, introduced into this work, will be ſuch as appear to have ſufficient novelty, and importance, to be deemed worthy a republication here. And if any paſſage of moment occur, that is obſcure, or too general and inexplicit for practical application, recourſe will be had to the fountain-head whence the intelligence flowed, for ſuch further explanation as may be required. The improvements, which the foreign ſocieties themſelves are daily undergoing, will render them in a ſhort time a copious ſource of uſeful information. And as they have borrowed their ſpirit and

plan

plan from us, we ought, in our turn, to ſeek every advantage, that can be derived from the fruits of them.

All communications, from private individuals, of ingenious obſervations, or accounts of the reſult of experiments, and material facts relating to agriculture, gardening, or other uſeful arts, will have a grateful reception in theſe Memoirs; and be publiſhed in their due order, as they are ſent. And it is hoped, that no perſon, who can furniſh any information of this kind, which may be likely to prove of public benefit, will be deterred from imparting it, by a diffidence as to ſtyle, or ability of writing, on account of not being accuſtomed to ſuch kind of compoſitions. For, if the ſenſe only be intelligibly expreſſed by the correſpondent, care will be taken, before the printing, to correct all inaccuracies; and ſupply any defects of language, where needful. This intimation is the more neceſſary, as it is known, there are many, who, from a modeſty in this point, have ſuppreſſed valuable diſcoveries, and obſervations, which they were, otherwiſe, diſpoſed to have made known.

It may be expedient, alſo, to mention here, that nothing perſonal nor foreign to the profeſt ſubjects of the work will be admitted into it.

it. In writings of this kind, every party ſhould be at liberty to maintain his own opinion, or oppoſe, by arguments, that of others, who differ from him. But the diſputation ſhould be reſtrained to the matter in queſtion ſolely; and not ſuffered to degenerate into reflections on the writers or their abilities. The want of due regard to the preſerving this regularity, and *decorum*, in the *Muſeum Ruſticum*, which was too much neglected till the laſt half year, was an injury to that work. The wide deviations from the plan; futile criticiſms, and tedious repetitions and replications on points of little conſequence; not to mention ſarcaſms, and cenſures unbecoming gentlemen to write of each other; depreciated, in ſome meaſure, the value of the whole; and would have brought it into diſcredit, had not many excellent pieces, from more ſenſible and liberal pens, compenſated for the exceptionable part. If, therefore, any inadvertent expreſſion or paſſage, that may tend to give diſguſt, or may carry the appearance of impropriety, ſhall eſcape from our correſpondents, it is requeſted, they will excuſe ſuch expreſſion's being ſoftened; or paſſages expunged, if not relative to the proper ſubject; as it is reſolved to keep this work, as much as poſſible, free from every thing illiberal, trivial, or not pertinent.

Several

Several gentlemen, who are engaged, with great ſpirit, in the improvements of huſbandry by experiments in a very large way, have engaged to communicate the reſult of their labours. It is hoped, their example will incite others, likewiſe, to aſſiſt, in a purſuit of ſo much importance, as the advancement of agriculture is at preſent in our country. But the ability of being ſerviceable to the public, in this way, is not limited to thoſe, who have opportunity, or inclination to make trials, and experiments, or to apply themſelves to theoretic ſpeculations. It is not, by the invention of new matters only, that this great end may be promoted. For the rendering more general, in many caſes, the knowledge of the beſt methods now followed, the practice of which is confined to particular places, or countries, is another not leſs effectual means. The information wanted to the public in ſuch points may be eaſily given by thoſe, who have a conſtant occaſion to ſurvey the object: and, in this way, very great good may be done to the world with very little trouble to the writer.

To conclude, every other means will be employed, to render theſe Memoirs extenſively beneficial to the public, as well with reſpect to the advancement of agriculture, as all inventions,

tions, or improvements of other matters, that properly fall within the cognizance of the plan. And it is preſumed, that not only Great-Britain, and Ireland, may reap conſiderable advantages from it; but that the colonies, alſo, may partake of them, even in a yet more eſſential manner: as they have a greater neceſſity for ſuch help. The honour, as well as the intereſt of our country, is highly concerned in the eſtabliſhment of ſuch a work: ſince we ſhould juſtly incur the imputation of a faulty ſupineneſs in that point, if we were longer to neglect this obvious means of promoting improvements of the utmoſt conſequence to our welfare; which almoſt every other civilized ſtate has adopted, even with the *immediate aſſiſtance of government.* We hope, therefore, the publication of theſe Memoirs will have the aid of the ingenious and the encouragement of the public-ſpirited; that we may be enabled to ſhew by their merits, and ſucceſs, our country is not leſs attentive in this, than in other particulars, to maintain the ſuperiority, which at preſent diſtinguiſhes us in *ſcience*, and *œconomical arts*, as well as *arms*, from all our neighbours and rivals.

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ERRATA.

Page 17, omit the third and fourth lines. P. 22, inſert the following words, viz. *A machine for grinding and poliſhing glaſs. Jeremiah Burrows* 70*l.* P. 50, line laſt but one, for *fifty*, read *ſixty*; line laſt, for *ſixty-ſeven pounds, thirteen ſhillings*, read *ſixty-eight pounds, three ſhillings*. P. 53, l. 7, after 15, add 15. P. 64, l. 7, for *Colereed*, read *Coleſeed*. P. 71, l. 1, for *one acre for ſix other*, read *one acre for each of the ſix other*. P. 77, l. 19, omit the word *even*. P. 84, l. 20, for *where the hurts*, read *where hurts*. P. 102, l. 10, for *ſubſtance*, read *ſurface*. P. 116, l. 3, for *ſtraw hats for women*, read *ſtraw hats, like the Italian, for women*. P. 241, l. 4, for *between the 1ſt of* 1762, read *between the 1ſt of April*, 1762. P. 302, l. laſt but three, for 1761, read 1768. P. 385, l. 2, after the table, for *four pence*, read *ſix-pence*. P. 414, l. 16, for *weeks*, read *week*. P. 415, l. 15, for *planting*, read *plantling*.

MEMOIRS

OF

AGRICULTURE,

AND OTHER

OECONOMICAL ARTS.

ARTICLE I.

A List *of all the Premiums, Bounties,* &c. *relating to Agriculture, Manufactures, Mechanics, Chemistry, and Trade, given by the* Society for the Encouragement of Arts, Manufactures, and Commerce, *from their institution, to the end of the year* 1767. *Inserted at the Desire of the Society.*

THIS List of premiums and bounties is inserted here, not only in conformity to the desire of the Society, but for the following reasons:

I. That it will be a satisfaction to the rational curiosity of many, to be informed of all the objects of encouragement of the kinds here enumerated,

for which the Society have actually given rewards; of the reſpective mode, quantum, &c. of thoſe rewards; and of the names of the perſons on whom they have been beſtowed.

II. That it will ſerve to illuſtrate ſeveral matters in the ſequel of theſe Memoirs, particularly in the following brief hiſtory of the Society's tranſactions, to ſee the chronological order of the rewards given for each object; and to be enabled thence to form a judgment of the progreſs of the ſucceſs of the Society's premiums, and proceedings with regard to it.

III. That, information being thus furniſhed of all the various attainments of inventions, and improvement, every perſon to whom any of them may be particularly uſeful, will be, by that means, put in the way of applying them to their advantage.

IV. That, with regard to agriculture, the ſucceſs and extent of the ſeveral attempts, and trials, in the culture of new articles being diſplayed, it may ſhew how far they may be conſidered as the grounds of encouragement for introducing ſuch articles into practice: and the names of thoſe who have made theſe trials, or attempts, being here ſupplied, an opportunity is afforded in many caſes of obtaining ſuch information or aſſiſtance from them, as may greatly conduce to ſurmount the difficulties, others may find in their endeavours at the ſame performances.

To

To ROBERT DOSSIE, *Eſq.*

SIR,

I am directed by the Society for the Encouragement of Arts, Manufactures, and Commerce, to ſend you the following liſt of all the premiums relating to agriculture, manufactures, mechanics, chemiſtry, and trade; in order to their being publiſhed in the Memoirs of Agriculture, if you think proper.

By Order of the Society,

March 8, 1768. GEO. BOX,

Aſſiſtant Secretary.

A Liſt of all the Premiums, Bounties, &c. relating to Agriculture, Manufactures, Mechanics, Chemiſtry, and Trade, given by the Society for the Encouragement of Arts, Manufactures, and Commerce, *from the Beginning of the Society, to the End of the Year* 1767.

PREMIUMS relating to AGRICULTURE.

1755.

Madder, for raiſing and curing 20 lb. of good, Mr. Thorp, 30 l.

1758.

Madder, for producing the largeſt roots of three years growth, 20 in number, Mr. Nic. Criſp, 20 l.

Ditto, for ditto, of one year's growth, Mr. Shaw, 16 l.

Ditto, for ditto, of two years growth, Mr. John Roſe, 10 l.

Madder, for producing the largeſt roots of one year's growth, Mr. Suter, 8 l.

Acorns, for ſowing 23 acres, the duke of Beaufort, a gold medal.

1759.

Madder, for producing the largeſt roots, more than 20 in number, Mr. John Suter, 26 l.

Ditto, for ditto, Mr. Samuel Shaw, 20 l.

Ditto, for ditto, Mr. Brownton, 8 l.

Acorns, for ſowing 23 acres, 1 perch, with 101 buſhels 1 peck, and 1 acre, 2 roods, 2 perches, with 4 buſhels, Dennis Rolle, eſq. a gold medal.

Ditto, for ſowing 21 acres, 10 perches, Philip Carteret Webb, eſq. a ſilver medal.

Ditto, for ſowing 5 acres, and upwards, John Berney, a ſilver medal.

Ditto, for ſowing 10 acres, 3 roods, 8 perches, with 49 buſhels, 2 pecks, T. Drew, a ſilver medal.

1761.

Madder, for planting above 10 acres, William Kemp, 50 l.

Scotch Fir, for planting 101394, Dennis Rolle, eſq. a gold medal.

Ditto, for planting 24000, Robert Sutton, a ſilver medal.

Ditto, for planting 6000, Matthew Lee, a ſilver medal.

1762.

Acorns, for ſowing 20¼ acres, 8 rods, Lord Winterton, a gold medal.

Ditto, for ſowing 11 acres, 3 roods, 20 poles, Duke of Bedford, a ſilver medal.

Stocks of Bees, for the greateſt number, being 223, Thomas Fawcet, a gold medal.

Ditto, for the next greateſt, being 110, Thomas Slarke, a ſilver medal.

1763.

1763.

Lucerne, for ſowing about 16 acres, Humphry Sturt, 20 l.

Ditto, for ſowing 7 acres, Col. Taylor, 50 l.

Hemp, for ſowing 15 acres, 2 roods, 3 perches, John Davy, 30 l.

Ditto, for ſowing 12 acres, 1 rood, 14 ½ perches, Giles Hawkins, 10 l.

Ditto, for ſowing 66 acres, 3 roods, 15 perches, James Higgins, 40 l.

Ditto, for ſowing 14 acres, 1 rood, 4 perches, John Woolmonton, 20 l.

Madder, for planting 1 acre, John Cooke, 5 l.

Ditto, for planting 1 acre, William Trevillian, eſq. 5 l.

Ditto, for planting 3 acres, Mr. William Wilcocks, 15 l.

Ditto, for planting 29 acres, Meſſ. Kemp and Lane, 145 l.

Ditto, for planting 1 acre, Mr. Wm. Faviman, 5 l.

Ditto, for planting 4 ½ acres, John Thorpe, 22 l. 10 s.

Ditto, for planting 3 acres, Rev. Mr. Barber, 15 l.

Ditto, for planting 1 acre, John Simmons, 5 l.

Ditto, for planting 1 acre, Mr. J. Harriſon, 5 l.

Ditto, for planting 10 acres, Mr. William Hutchins, 50 l.

Ditto, for planting 1 acre, Meſſ. Humphrey and Vinal, 5 l.

Ditto, for planting 1 acre, Rev. Mr. Peel, 5 l.

Ditto, for planting 1 acre, Mr. Wm. Pickering, 5 l.

Ditto, for planting 3 ¼ acres, Mr. Ja. Cole, 16 l. 5 s.

Madder, for planting 1 acre, Daniel Colgate, 5 l.

Ditto, for planting 2 acres, Joſeph Mace, 10 l.

Ditto, for planting 6 acres, Geo. Foſter Tuffnell, eſq. 30 l.

Elms, for planting 6100 plants, the earl of Portſmouth, a gold medal.

Cheſnuts, for planting 2 acres, 3 roods, 12 perches, John Freeman, eſq. a gold medal.

Ditto, for planting upwards of 5 acres, Geo. Foſter Tuffnell, eſq. a gold medal.

Scotch Fir, for planting 30,000 plants, Francis Trottman, a gold medal.

Ditto, for planting 16,000 plants, Thomas Batchelor, eſq. a ſilver medal.

Ditto, for planting 16000 plants, the duke of Bedford, a ſilver medal.

Bee Hives, for having 185, Thomas Fawcett, a gold medal.

Ditto, for having 128, Thomas Slarke, a ſilver a medal.

1764.

Acorns, for ſowing 22 acres, John Buxton, eſq. of Ruſhford, Norfolk, a gold medal.

Scotch Fir, for planting 104000 plants, Robert Fenwick, eſq. Lemington, Northumberland, a gold medal.

Ditto, for planting 14000 plants, John Mount, eſq. Waſing, Berks, a ſilver medal.

Lucerne, for ſowing 13 acres, 23 rods, John Vallance, of Patcham, Suſſex, 20 l.

Ditto, for ſowing 12 acres, 3 roods, 11 rods, James Bedell, of North Cray, Kent, 15 l.

Carrots, for ſowing 30 acres, 2 roods, Mr. Rob. Billing, of Weaſenham All-Saints, Norfolk, 20 l.

White Clover Seed, for ſowing 21 Cwt. 1 qr. 13 lb. John Freeman, eſq. of Chute-lodge, Wilts, 20 l.

Madder,

Madder, 5 l. for every acre planted, to the following candidates, viz.

1 Acre, Mr. Francis Harris, of Iver, Bucks.

1 Acre, 24 rods, Mr. John Goddard, of Ditching, Suſſex.

15 Acres, Meſſ. Abr. Prebble and Joſ. Royle, of St. Mary North-gate, Canterbury.

2 Acres, Everard Buckworth Herne, eſq. of Haverland, Norfolk.

1 Acre, Mr. Francis Buti, of Birchington, Thanet.

1 Acre, Rev. Mr. John Peele, of Tinley, Norfolk.

2 Acres, Mr. John Ranſon, of Stowmarket.

7 Acres, Meſſ. John Lane and William Kemp, of Teynham, Kent.

2 Acres, Mr. John Simmons, of Preſton, Kent.

1 Acre, Mr. James Cole, of Ditchingham, Norfolk.

3 Acres, Mr. Francis Crumpe, of Batterſea, Surry.

1 Acre, Mr. Jacob Patterſon, of Whitham, Eſſex.

1 Acre, 27 rods, Mr. Joſeph Flight, of Bermondſey, Surry.

2 Acres, Mr. John Flight, of Thames-Ditton, Surry.

2 Acres, William Hutchins, eſq. of Barn-Elms, Surry.

2 Acres, Mr. William Goſſe, of Ringwood, Hampſhire.

Hemp, for ſowing 35 acres, 37 perches, Joſeph Higgins, of Preſton, Salop, 40 l.

Ditto, for ſowing 19 acres, 3 roods, 16 perches, John Elſmere, of the pariſhes of St. Julian and Pontſbury, Salop, 30 l.

Hemp, for ſowing 43 acres, 3 rood, 10 perches, and $\frac{7}{8}$, John Davy, of Yeovil and Weſt Coker, Somerſet, 30 l.

Ditto, for ſowing 31 acres, Giles Hawkins, of Eaſt Chinnock and Weſt Coker, Somerſet, 10 l.

Bee Hives, for having 124 ſtocks, Mr. Thomas Fawcet of Oxque, Yorkſhire, a gold medal.

Ditto, for having 105 ſtocks, Mr. Thomas Haynes, of Oundle, Northamptonſhire, a ſilver medal.

Burnet, for the improved culture of, Mr. Rocque, of Walham-green, a bounty of 50 l.

Plough for turning up heath-ground; and a *Horſe-thiſtle-cutter*, for inventing, Mr. Ringroſe, a bounty of 10 guineas.

1765.

Elms, ſmall leaved Engliſh, for planting 1490, William Earle, eſq. of Malmſbury, Wilts, a gold medal.

Scotch Fir, for planting 102000, Robert Fenwick, eſq. of Lemington, Northumberland, a gold medal.

Carrots, for ſowing 24 $\frac{1}{2}$ acres, Robert Billing, of Weaſenham, Norfolk, 20 l.

White Clover Seed, 10[illegible]9 lb. wt. produced on 14 acres, Thomas Haſker, of Cherfield-upon-London, Hants, 20 l.

Burnet, for ſowing 8 acres, 1 rood, 8 perches, Rev. Mr. Davies Lamb, rector of Ridley near Dartford, Kent, 20 l.

Ditto, for ſowing 5 acres, 1 rood, 4 rods, Mr. Richard Scraſe, of Withdean, Suſſex.

Madder, 5 l. for every acre planted to the following candidates, viz.

4 Acres, John Harriſon, of Preſton, Kent.

2 Acres

2 Acres, John Simmons, of Preſton, Kent.

1 Acre, Arthur Young, eſq. of Bradfield, Suffolk.

2 Acres, Joſeph Flight, of Batterſea, Surry.

1 Acre, John Thorp, of Thames-Ditton, Surry.

1 Acre, Rev. Bariah Brook, of Rede, Suffolk.

2 Acres, John Cooke, eſq. of Tunbridge, Surry.

1 Acre, Rev. John Barber, of Great Cheſterford, Eſſex.

1 Acre, John Suter, of Barnes, Surry.

1 Acre, Joſ. Talmin, of St. Leonard's, Bromley.

15 Acres, William Hutchins, eſq. of Barnes, Surry.

1 Acre, Francis Crumpe, of Batterſea, Surry.

1 Acre, Rev. John Peele, of Tilney, Norfolk.

2 Acres, George Payne, eſq. of Weybridge, Surry.

Hemp, for ſowing 37 acres, Giles Hawkins, of Weſt-Coker, Somerſet, 40 l.

Ditto, for ſowing 29 acres, John Davy, of ditto, 30 l.

Ditto, for ſowing 10 acres, William Preſton, of Crowland and Whaplad-Drove, Lincolnſhire, 20 l.

Ditto, for ſowing 18 acres, Joſ. Higgins, of Preſton, Salop, 30 l.

Ditto, for ſowing 15 acres, John Elſmere, of Shrewſbury, 20 l.

Ditto, for ſowing 15 acres, Samuel Elſmere, of Almond Park, Salop, 10 l.

Bee Hives, for having 182 ſtocks, Mr. Thomas Fawcet, of Oxque, Yorkſhire, a gold medal.

Bee-

Bee-hives, for having 150 ſtocks, Mr. Thomas Harvey, of Elmdon, Eſſex, 10 l.

Machine for dreſſing Wheat and Malt, before they are ground, Mr. Robert Mackell, a bounty of 50 l.

Machine for threſhing Corn, uſed in Connecticut, Mr. Harvey, a bounty of 15 l.

1766.

Acorns, for ſowing 37 acres, Blunden Moore, eſq. of Byfleet, Surry, a gold medal.

Elms, ſmall leaved Engliſh, for planting 2140, John Freeman, eſq. of Chute-lodge, Wilts, a gold medal.

Scotch Fir, for planting 100,000, Robert Fenwick, eſq. of Lemington, Northumberland, a gold medal.

Ditto, for planting, 18,000, Lord Scarſdale, a ſilver medal.

Burnet, for ſowing 37 acres, John Searancke, eſq. of Hatfield, Hertfordſhire, 20 l ‡.

Ditto, for ſowing 16 acres, Chriſtopher Baldwin, eſq. of Clapham-common, Surry, 15 l.

Ditto, for ſowing upwards of 10 acres, Robert Barber, eſq. of Gover, near Exeter, 10 l.

Graſs Seeds, for gathering by hand, viz.

Meadow-Foxtail, Mr. William Judge, Widford, Eſſex, 5 l.

Creſted Dogs-Tail, Mr. Edward Birch, of Stone-Eaſton, Somerſet, 5 l.

Ditto, Mr. William Goſſe, of Ringwood, Hants, 3 l. 3 s.

‡ N. B. Mr. Searancke relinquiſhed the premium: and a gold medal was preſented to him by the Society, as below 1767.

Barley,

Barley, &c. For an account of the moſt profitable method of cultivating, Sir Digby Legard, bart. of Gantor, Yorkſhire, a gold medal.

Wheat, for ditto, Rev. Mr. H. Lowther, rector of Aikton, a gold medal.

Lucerne, for ditto, William Taylor, eſq. of Cannon-hill, Surry, a gold medal.

Turneps, for ditto, Mr. John Willy, South Petherton, Somerſetſhire, a gold medal.

Bee Hives, for having a number of ſtocks, not leſs than 30, to each of the following perſons, 5 l. viz.

William White, of Shetford, Oxon, 32 ſtocks.
John Edmonds, of Rudſton, Yorkſhire, 38.
Thomas Shovelar, of Biſhopſbourn, Kent, 35.
James Snelling, of Woking, Surry, 35.
John Howard, of ditto, 32.
Mary Pitches, of Eaning, Suffolk, 30.
Thomas Fawcet, of Oxque, Yorkſhire, 122.
Richard Jeniſon, of Market-Weighton, Yorkſhire, 31.
Robert Bruce, of Ford, Northumberland, 33.
Jonathan Satchell, of Kettering, Northamptonſhire, 39.
John Short, of Chilbolton, Southamptonſhire, 36.
John Pendred, of Wellingborough, Northamptonſhire, 42.
William Gilbert, of Exning, Suffolk, 32.
Thomas Slarke, of Sunning-hill, Berks, 78.
Benjamin Harris, of Aſton Tirrold, Berks, 30.
Richard Weſt, of South Reſton, Lincolnſhire, 75.
Thomas Young, of Waltham-croſs, Hertfordſhire, 34.
Andrew Turner, of Elvetham, Hants, 30.

John

John Winter, of Great Gonerby, Lincolnſhire, 30.

Peter Daley, of Woodbury, Devon, 45.

Nathaniel Cory, of Bugbrook, Northampton-ſhire, 30,

Drill Plough, for inventing, Rev. Mr. H. Gainſborough, of Henley, Oxon, 30 l.

Ditto, for inventing, Mr. James Willy, of South Petherton, Somerſetſhire, 20 l.

Machine for turning up gravel in walks, for inventing, Mr. Edward Cooper, of Kenſington, Middleſex, a bounty of 10 guineas.

1767.

Drain Plough, for inventing, Mr. Cuthbert Clarke, of Belford, Northumberland, 50 guineas.

Spaniſh Cheſnuts, for ſetting 12000, Lord Viſcount Turner, a gold medal.

Elms, ſmall leaved Engliſh, for planting 2000, Earl Winterton, a gold medal.

Graſs Seeds, for gathering by hand, viz.

Meadow-Feſcue, Mr. Tho. Stacey, of Mitcham, Surry, 10 l.

Ditto, Mr. Wm. Goſſe, of Ringwood, Hampſhire, 2 guineas.

Vernal Graſs, ditto, 10 l.

Fine Bent, William Black, of Wagher, Yorkſhire, 10 l.

Ditto, Mr. William Goſſe, 2 guineas.

Creſted Dog's-tail, Mr. William Black, 10 l.

Ditto, Mr. James White, of Leigh on Mendip, Somerſetſhire, 5 l.

Madder, 5 l. for every acre, to each of the following perſons, viz.

1 ½ Acre, Mr. John Lane, of Teynham, Kent.

8 Acres, William Hutchins, of Barnes, Surry.

1 Acre,

1 Acre, John Harriſon, of Preſton, Kent.

1 Acre, John Dudlow, of St. Mary North-gate, Canterbury.

1 Acre, Broome Witts, of Chippingnorton, Oxon.

1 Acre, Thomas Parſons, of Taunton, Somerſetſhire.

1 Acre, Rev. Daniel Hill, of Eaſt Malling, Kent.

1 Acre, William Fairman, of Tonge, Kent.

15 Acres, Joſeph Flight, of Compton, Surry.

1 Acre, James Johnſon, of Great Shelſley, Worceſterſhire.

1 Acre, Thomas Giles, of Brabourne, Kent.

1 Acre, Charles Roſe, of St. John, Devizes.

1 Acre, Arthur Young, of Bradfield Combreſt, Suffolk.

1 Acre, Joſ. Royle and Abraham Prebble, of St. Mary Northgate, Canterbury.

1 Acre, William White, of Ide, near Exeter.

Plough for draining lands, for inventing, Mr. Knowles, of the Iſle of White, 50 guineas.

Machine for ſlicing turneps, for inventing, Mr. James Edgell, of Frome, Somerſetſhire, 20 l.

Scotch Fir, for planting 46000, Mr. John Wright, of Lombard-ſtreet, London, a gold medal.

Turnep Cabbage, for cultivating, Robert Colville, eſq. of Newton, in the Iſle of Ely, Cambridgeſhire, 20 l.

Madder, for cultivating, John Arbuthnot, eſq. of Mitcham, Surry, was preſented with a gold medal.

Burnet, for having ſown 37 acres, John Searancke, eſq. of Hatfield, Hertfordſhire, was preſented with a gold medal.

Trenching

Trenching Plough, and a *Three Furrow Plough*, for inventing, Mr. Ducket, a bounty of 50 l.

PREMIUMS relating to MANUFACTURES.

1755.

Buff Leather, for making, of 5 ox-hides dreſſed in oil, which appeared equal to the foreign buff, Mr. Bullock, 10 l.

Copper, for tinning, in a perfect manner, Mr. Bootie, 10 l.

1757.

Engliſh Carpets, for the beſt, in imitation of the Turky, Mr. Moore, 25 l.

Ditto, Mr. Whitty, 25 l.

Paper for Copper Plates, neareſt to the French, Mr. Taylor, 7 guineas.

1758.

Engliſh Carpets, for the beſt, in imitation of the Turky, Mr. Whitty, 25 l.

Ditto, Mr. Paſſavant, 25 l.

Work-houſes, for publiſhing a book on, Mr. William Bailey, 50 l.

1759.

Worſted Yarn, for ſpinning, John Sculfer, 15 l.

Linnen Yarn, for ſpinning, Robert Price, 10 l.

Drugget fit for the Liſbon market, for making, George Walker, 10 l.

Ditto, Meſſ. Williams and Penwaine, 20 l.

Silk Paper, for making the greateſt quantity, Mr. Clement Taylor, 20 l.

Ditto, the next greateſt, Mr. Wm. Quelch, 10 l.

Cotton, for ſpinning in Luton work-houſe, Wm. Hay, 10 l.

Engliſh Carpets, for making the beſt, in imitation of the Turky, Mr. Tho. Whitty, 30 l.

Ditto

Ditto, for the next beſt, William Jeſſer, 20 l.

Engliſh Mill-ſtones, for producing the beſt, Mr. Wainwright, 15 l.

Ditto, for the next beſt, Henry Watſon, 10 l.

Catgut, for twiſting to make ſtrings for muſical inſtruments, Mrs. Laroach, a bounty of 6 guineas.

Ditto, Mr. Rob. Williams, a bounty of 6 guin.

1760.

Worſted Yarn, for ſpinning, Richard Neale, 12 l.

Linnen Yarn, for ſpinning, Robert Price, 20 l.

Worſted Yarn, for ſpinning, in Quakers Workhouſe, Clerkenwell, Leonard Snowden, 8 guineas.

White Enamel, for making, Iſaac Nerbell, a bounty of 10 guineas.

Drugget for the Liſbon-market, for making the beſt, John Pike, 20 l.

Silk Paper, for making the greateſt quantity, James Simmons, 20 l.

Ditto, for the next greateſt, Fr. Chapman, 10 l.

Silk Graſs, for manufacturing, John Thomas, a gratuity of 2 guineas.

1761.

Linnen Yarn, for ſpinning, in Plymouth Workhouſe, Thomas Perren, 20 l.

Fine Linnen Yarn, for ſpinning, Jarret Wilſon, a bounty of 5 guineas.

Spinning Wheel, for the greateſt improvement of, Thomas Perten, 10 l.

Ditto, for the next greateſt, John Webb, 20 l.

Drugget for the Liſbon market, for making the beſt, Mr. Jam. Maynard, 20 l.

1762.

Point Lace, for information relating to, Mrs. Dorothy Holt, 10 guineas.

Worſted Yarn, for ſpinning, Robert Rice, 20 l.

Fine Linnen Yarn, for ſpinning, Jarret Wilſon, 5 guineas.

Long

Long-ſhed Spinning Wheel, for the greateſt improvement of, Thomas Perren, 30 l.

Linnen Yarn, for ſpinning from fine flax, John Vaux, 30 l.

Chip-Hats like the Italian, for making the beſt, Sarah Meyer, 10 guineas.

Ditto, for the next beſt, Benj. Slim, 5 guineas.

Reel for winding ſilk from the cocoons, for the invention of, Mr. Verrier, a bounty of 40 l.

Druggets for the Liſbon market, for making the beſt, John Maynard, 30 l.

Quilting in the loom in imitation of the Marſeilles and Indian quilting, for the beſt ſpecimen, Obadiah Rider, 40 l.

Ditto, for the next beſt, Joſeph Barnes, 20 l.

1763.

Paper for copper-plates, neareſt in quality to the French, for making, Thomas Cook, 25 l.

Point Lace, for making, Miſs La Croix, 10 guin.

Ditto, for making, Miſs Dallas, 12 guineas.

Ditto, for making, Miſs Mary Parker, a bounty of 10 guineas.

Ditto, for making, Miſs Heſter Bootie, 8 guin.

Fine Linnen Yarn, for ſpinning, Hannah Demſtane, a bounty of 5 guineas.

Marbled Paper, for making the beſt, Meſſ. Portbury and Smith, 50 l.

Chip Hats like the Italian, for making the beſt, Mary Stephens, 3 guineas.

Comb Pot, for inventing, Samuel Hayward, jun. a bounty of 30 guineas.

Spinning Wheel for ſix threads, for inventing, George Buckley, a bounty of 20 guineas.

1764.

Chip Hats like the Italian, for making the beſt, Benj. Slim, 5 guineas.

Ditto,

Chip Hats like the Italian, for making the next beſt, Mary Dorrington, 3 guineas.

Spinning Wheel for two Threads, for conſtructing, William Harriſon, 50 l.

Paper for Copper Plates, neareſt in quality to the French, Mr. Tho. Cooke of Tottenham, 25 l.

Point Lace, for making, Mrs. Mary Parker, 15 guineas.

Ditto, Mrs. Eſther Booty, 8 guineas.

Ditto, Mrs. Mary Booty, 5 guineas.

Quilting in the loom in imitation of the Marſeilles and Indian quilting, for the beſt, Mr. Humph. Slim of Friday-ſtreet, London, 50 l.

Ditto, for the next beſt, Mr. Joſ. Shaw, of Bolton, Lancaſhire, 30 l.

Ditto, for the third beſt, Mr. Mich. Badge, of Spital-fields, London, 20 l.

Horizontal Spinning Wheel, for the improvement of, Mr. William Harriſon, of Eaſt-ſtreet, Red-Lion-ſquare, 50 l.

Fine Linnen Yarn, for ſpinning, Mrs. Hannah Dunſtone, of South-Petherton, Somerſet, 8 guineas.

Ditto, Mrs. Eliz. Biſhop, of Crewkerne, Somerſetſhire, 5 guineas.

Emboſſed Paper, for the invention of the art of making, Mr. Benjamin Moore, Newgate-ſtreet, a bounty of 50 guineas.

Lace with knitting-needles, for the invention of the art of making, Mrs. Mary Whiteſide, a bounty of 10 guineas.

1765.

Quilting in the loom, Silk, Cotton, or Linnen, for the greateſt improvement of, Benjamin Slim, of Golden-lane, Old-ſtreet, London, 50 l.

Quilting in the Loom, Silk, Cotton, or Linnen, for the next greateſt, Joſeph Shaw, of Bolton, Lancaſhire, 30 l.

Ditto, for the third greateſt, Jonathan Baker, of Booth-ſtreet, Spital-fields, London, 20 l.

Quilting in the Loom, Woolen, for the greateſt improvement of, Nicholas Pearſal, of Kidderminſter, 50 l.

Ditto, for the next greateſt, John Parrock, of Booth-ſtreet, Spital-fields, London, 30 l.

Ditto, for the third greateſt, James Clifton, of Webb-ſquare, Shoreditch, 20 l.

Spinning Wheel, for the greateſt improvement of, Thomas Perien, maſter of St. Sepulchre's workhouſe, 20 l.

Chip-Hats like the Italian, for making the greateſt quantity of the beſt, Benj Slim, of Golden-lane, Old-ſtreet, 3 guineas.

Fine Linnen Yarn, for ſpinning, Eliz. Biſhop, of Crewkerne, Somerſetſhire, 5 guineas.

Stocking Frame, for the improvement of, Samuel Unwin, of Sutton, Nottinghamſhire, 80 l.

Machine for winding and doubling Worſted, &c. for the improvement of, Jer. Burrows, of Southwark, 10 l.

Ditto, William Caiger, at the academy, Guildford, 10 l.

Thread-Lace, for knitting the beſt, Elizabeth Boulton, of St. Martin's Le Grand, 10 guineas.

Tanning with Oak Saw-duſt, for revealing the method of, Mr. John Eldridge, of Battle, Suſſex, a bounty of 100 l.

Point Lace, for making, Miſs Theodoſia Burgeois, of Derby, a bounty of 10 guineas.

Irons for drawing Gold, Silver, and Braſs Wires, for improving, Mr. Waller, a bounty of 10 guin.

1766.

Spinning-Wheels, for the greateſt improvement of, William Garrat, 30 l.

Ditto, for the next greateſt, —— Webb, 15 l.

Cleanſing Brown Oſnaburgs, like the foreign, for ſhewing the method of, Samuel Unwin, of Sutton, Nottinghamſhire, 25 l.

Stocking Frame, for the greateſt improvement of, John Whyman, of Aſton upon Trent, near Derby, 100 l.

Machine for winding and doubling Thread, Worſted, and Cotton, for improvement of, William Garrat, 12 l.

Thread Lace, for knitting beſt, Mrs. Eliz. Boulton, of Dean's Court, St. Martin's Le Grand, 12 guineas.

Ditto, the next beſt, Miſs Elizabeth Gordon, of Folkſtone, Kent, 4 guineas.

Ditto, the third beſt, Mrs. Mary Whiteſide, of Lancaſter, 4 guineas.

1767.

Fine Linnen Yarn, for ſpinning, Eliz. Biſhop, of Bridport, Dorſet, 12 guineas.

Crayons, for a new method of preparing, Mr. Robert Stanley, a bounty of 20 guineas.

PREMIUMS relating to MECHANICS.

1757.

Hand-Mill, for the greateſt improvement of, Peter Lyon, 25 l.

Ditto, for the next greateſt, Mr. J. Gordon, 25 l.

1758.

Hand-Mill, for the greateſt improvement of, Mr. Parſons, 50 l.

1760.

Curious Locks, for the invention of two kinds of, Edward Gaſcoigne, a bounty of 10 guineas.

Ship-Blocks, for the beſt model of, Joſ. Aldridge, 30 l.

Tide-Mill, for the greateſt improvement of, Richard Lewis, 20 l.

Ditto, for the next greateſt, Joſ. Nicholls, 30 l.

Windmill, for the greateſt improvement of, Joſ. Nicholls, 50 l.

1761.

Machine for boring Auger Holes, Mr. Wm. Bailey, a bounty of 50 l.

Crane, for the improvement of, John Galabine, a bounty of 20 guineas.

Tide-Mill, for the improvement of, Rev. Mr. Humphry, of Gainſborough, 60 l.

Ditto, Mr. R. Lord, a bounty of 10 guineas.

Wind-Mill, for the improvement of, Mr. Lewis, 50 l.

Threſhing-Machine, for inventing, Mr. C. Lloyd, 15 l.

Hand-Mill, for the improvement of, a bounty to ditto, 50 l.

Machine to weave Brocades, for improvement of, Nich. Sebaſtian Favier, a bounty of 3 guineas.

Saw-Mill, for erecting and working the firſt year, James Stansfield, 100 l.

1762.

Cyder-Mill and Preſs, for the improvement of, Mr. Charles Lloyd, 20 guineas.

Wind-Mill, for the improvement of, Mr. James Verrier, a bounty of 50 l.

Crane, for the improvement of, James Ferguſon, a bounty of 50 l.

Tide Mill, for the improvement of, Joſ. Coulthard, 20 guineas.

Fiſh-carriage with four Wheels, for inventing, Steph. Boult, 20 l.

Ditto, with two Wheels, for inventing, Stephen Boult, 14 l.

Ditto, for the next beſt, Mr. Joachim Smith, 7 l.

Machine for planeing caſt Iron, for invention of, George Weldon, a bounty of 30 guineas.

1763.

Curious Locks, for inventing of, John Moore, a bounty of 20 guineas.

Saw-Mill, for keeping at work 2d and 3d year, James Stansfield, 75 l.

Model of a Saw-Mill, purchas'd of ditto, 100 l.

Ship-Blocks, for the firſt in merit, Nehem. Niſbett, 60 l.

Ditto, for the ſecond, William Oxenham, 20 l.

Ditto, for the third, Mr. William Conſtable, 10 l.

1765.

Saw-Mill, for keeping at work the 4th year, James Stansfield, 25 l.

Method to prevent Four-Wheeled Carriages overturning, for inventing, Thomas Cotton, of Chigwell, Eſſex, a bounty of 30 guineas.

Four-Wheeled Carriages, for an improvement of, Meſſ. Cranefield, a bounty of 30 guineas.

1766.

Copper-Plate Printing-Preſs, for an improvement of, Mr. Buffam, a bounty of 10 guineas.

Cranes, for the improvement of, Mr. Samſon, a bounty of 10 guineas.

Land Quadrant, for the improvement of, Mr. Hoſkins, a bounty of 10 guineas.

Saw-Mill, addition of a croſs-cutting ſaw to the model of, Mr. Stansfield, 10 guineas.

Machine for raiſing Water by Wind, for inventing, Mr. B. Merriman, a bounty of a ſilver medal.

Hanging Gates and Doors, for improvement in, Mr. John Orme, a bounty of 10 guineas.

1767.

Inſtruments to gauge Veſſels, for the improvement of, Mr. Hafford, a bounty of 20 guineas.

Pump for extracting Water out of Ships, for the greateſt improvement of, Mr. Charles D. Bowden, Black-friars-bridge, Surry, 100 l.

Perambulator, or Inſtrument for eaſily meaſuring Ground, for the invention of, Mr. Edgeworth, Harehatch, Berkſhire, a bounty of a ſilver medal.

Compaſs and Protractor, for the improvement of, Aaron Miller, a bounty of 10 guineas.

Machine for ſlicing Turneps, for the improvement of, Mr. W. Bailey, a bounty of 10 guineas.

Wheel Crane, for an improvement of, by an addition for preventing fatal accidents to the men, Mr. Chriſt. Pinchbeck, a bounty of a gold medal.

Invention of a Method for preſerving the Lives of Sailors and Cargoes of Ships when caſt away, Mr. John Wynn, a bounty of a ſilver medal.

PREMIUMS relating to CHEMISTRY, &c.

1755.

Cobalt, for producing from a Britiſh mine, Mr. Beauchamp, of Truro, 30 l.

1758.

Verdigriſe, for making 100 lb. wt. Mr. Jacob Hagen, jun. 20 l.

1761.

1759.

Staining Marble, for improvements in, Mr. Herbert Chambers, 10 l.

Crucibles, for making in England, Jean Sifferth, 30 l.

Earthen Retorts, for making, Henry Richards, 20 l.

For ſending abroad, and keeping Account of Experiments on Planks prepared with a compoſition for ſecuring Ships Bottoms from Worms, Dr. Lockman, a gold medal.

1761.

Crucibles, for making, William White, 30 l.

Train Oil, for revealing proceſſes for edulcorating, Robert Doſſie, eſq. 100 l.

Dying Cotton Yarn a Turky red, for inventing of, John Willon, 50 l.

1762.

Crucibles, for making in England, Jacob Lieberich, a bounty of 20 guineas.

Papin's Digeſter, for improving, David Creagh, a bounty of 30 guineas.

1763.

Verdigriſe, for making the greateſt quantity of, John Bindley, eſq. 50 l.

Compoſition to prevent Steel from ruſting whilſt manufacturing, for inventing of, John Monk, 20 l.

Varniſh like Martin's, for making, Mr. Stephen Bedford, 15 l. part of the premium.

1764.

Zaffre and Smalt, for making, Nicholas Criſp, Low-church-yard London, 50 l.

Subſtitute for Flax, for inventing of, Edward Carter, a bounty of 10 l.

Verdigriſe, for making the greateſt quantity, and the beſt, John Bindley, eſq. 100 l.

Salt-Petre, for making in America, Jeremiah Brown, Virginia, a bounty of 50 l.

Dying Cotton Yarn Turky red, for invention of, Simon Spurrett, of Iſleworth, Middleſex. 100 l.

1766.

Cotton and Linnen Yarn, green, for dying the beſt, Humph. Jackſon, 20 l.

Crucibles, for making in England, Jacob Lieberich, 50 l.

1767.

Linnen Yarn, yellow, for dying the beſt, T. Griffel, 40 l.

Ditto, green, for dying the beſt Thomas Griffel, 20 l.

Leather red and yellow, for revealing the manner of dying, as practiſed in Turky, Mr. Phillippo, an Aſiatic, 100 l.

For introducing the Eaſtern red and yellow Dyes of Leather into Great Britain, Mr. Phillippo, a gold medal preſented.

PREMIUMS relating to TRADE and COLONIES.

1755.

Mulberry Trees, for raiſing in Georgia, 18 l. remitted by B. Martin, eſq.

Ditto, for raiſing in Carolina, 18 l. remitted by Mr. John Watſon.

1759.

Silk Cocoons, for producing in Georgia, 87 l. 15 s. 11 d. to candidates.

1760.

Silk, for producing in Georgia, 136 l. 2 s. 9 d. ¾. to various candidates.

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1761.

Silk Cocoons of the beſt kind, for producing in Georgia, 100 l. 13 s. 9 d. ½, to various candidates.

Ditto for an inferior kind, 65 l. 14 s. 8 d.

Myrtle Wax, for importing the greateſt quantity, Mr. Perreneau, 30 l.

1762.

Myrtle Wax, for importing the greateſt quantity, Anth. Bacon, 20 l.

1763.

Silk Cocoons of the beſt kind, for producing in Georgia, 188 l. 15 s. 4 d. to various candidates.

Ditto for an inferior kind, 193 l. 7 s. 10 d.

For Care and Induſtry to promote in Virginia the purpoſes of this Society in the Britiſh colonies, Charles Carter, a gold medal.

Malleable Iron from the American black ſand, for Producing, Rev. Mr. Jared Eliott, a gold medal.

Pearl Aſh, for eſtabliſhing the manufacture of, in the colonies, Charles Dick, a gold medal.

1764.

Silk Cocoons, for producing in Georgia, 190 l. 1 s. 4 d. to various candidates.

1765.

Sturgeon, for importing from America the greateſt quantity, Edm. Boſham, eſq. 50 l.

Ditto, for the next greateſt, Meſſ. Bourryau, 25 l.

Silk, in Connecticut, premiums paid by Jared Ingerſhall, eſq. [illegible]

Pot-Aſh made in America, for importing, 4 l. each ton, to the following perſons, viz.

Meſſ. Hughes and Whitlock, 100 l.

Meſſ. Barnard and Harriſon, 80 l.

Meſſ. Lane and Booth, 216 l.

Meſſ.

Meſſ. Lane and Booth, 89 l. 4 s.
Mr. John Crowley, 4 l.

1766.

Silk Cocoons, for producing in Georgia, 155 l. 13 s. 11 l. to various candidates

Sturgeon, for importing from America the greateſt quantity, Mr. Humph. Jackſon, 50 l.

Pot-Aſh made in America, for importing, 4 l. for each ton to the following perſons, viz.

Meſſ. Champion and Haley, 10 l. 8 s. 6 d.
Meſſ. Menzies and Co. 7 l. 15 s.
Meſſ. Lane and Booth, 133 l. 15 s. 6 d.
Capt. Jacobſon, 2 l. 11 s. 6 d.
Mr. Abraham Dupuis, 20 l. 14 s.
Meſſ. Hughes and Whitlock, 224 l. 5 s.

For his uſeful Obſervations in China, and induſtrious application of them in Georgia, Mr. Sam Bower of Georgia, a gold medal.

Pearl-Aſh made in America, for importing, Sir Wm. Baker, 6 l. 2 s.

Silk-Cocoons, for producing in Georgia, 254 l. 12 s. 6 d. to various candidates.

Pot-Aſh, for effectually aiding to eſtabliſh the manufacture of, in North America, Robert Doſſie, eſq. a gold medal preſented.

Pot-Aſh, for his method of aſſaying, William Lewis, M. B. F.R.S. a gold medal preſented.

ARTICLE II.

An Account of all the Diſburſements of Premiums, Bounties, economical Expences, &c. by the Society for the Encouragement of Arts, Manufactures, and Commerce, *from its firſt Inſtitution to the End of the Year* 1766, *with the total of the Receipts by Subſcription, Legacies, &c.*

		£.	s.	d.
RECEIVED, by Subſcription, &c.		33,313	14	0
PAID.	Polite Arts,	6964	0	7
	Agriculture,	2202	10	10
	Manufactures,	1885	5	10½
	Mechanics,	2358	3	9
	Chemiſtry,	941	7	5½
	Colonies,	2273	18	4¼
	Exhibitions,	371	15	0
	Rent,	1477	1	6
	Salaries and Allowances,	3847	9	7¼
	Advertiſements,	854	19	6
	Printing and Stationary,	1098	12	11
	Houſe Expences,	592	2	11½
	Furniture,	761	14	5½
	Repairs,	897	4	5½
	Contingent Expences,	735	5	7
	Land Carriage beſh Plan,	3507	3	2
	Total	30768	16	0
	Ballance remaining,	2544	18	0

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ARTICLE III.

A brief Hiſtory of the Tranſactions of The Society for the Encouragement of Arts, Manufactures, and Commerce, *with Relation to the ſeveral Objects of Invention and Improvement, which they have adopted; and the reſpective Succeſs of their Proceedings.*

SECTION I.

INTRODUCTION.

THE plan of the Society for the Encouragement of Arts, Manufactures, and Commerce, was originally formed in the year 1753: and the firſt meeting was held at London, in March 1754. The Society conſiſted then only of a ſmall number of noblemen and gentlemen, who met privately to concert regulations and meaſures for the future conduct of their deſign. But the aſſiduous zeal with which they applied themſelves to eſtabliſh and extend it; and the evident national advantages, that might accrue from ſuch an inſtitution; produced, ſoon after the plan was made public, a rapid increaſe of members; and rendered the Society, in a few years, a very conſiderable body.

It muſt be allowed, indeed, that as to the priority of time when this Society was founded, it is not the firſt of thoſe which may be conſidered as of the ſame kind: nor has it, conſequently, the claim of originality. But, for the extenſiveneſs and importance

portance of its views, the number and reſpectable character of its members, and the ſucceſs of its undertakings, it has, by much, the pre-eminence over all others of a ſimilar nature, which have been hitherto any where inſtituted; and poſſibly will maintain that pre-eminence, over any, that ſhall be, hereafter, eſtabliſhed in the preſent age.

The diſſipation, and great variety of other concerns, which engage, or rather diſtract, the attention of the multitude in London, prevent, nevertheleſs there, an adequate regard to the tranſactions of this Society, or their momentous conſequences: and the diſparaging miſrepreſentations of its proceedings, which caprice has prompted ſome perſons to make, do not wholly fail of exciting prejudices. But the great encomiums given to it by foreigners; and their high conſideration of it, ſhewn by conſtant applications, ſome of them from ſovereign princes, and men of the higheſt reputation as to literature and ſcience, for information and the liberty of correſpondence; demonſtrate that the effects of the Society's endeavours, where they meet with leſs diſturbed and perverted obſervation, have raiſed the higheſt eſteem both of their plan, and conduct. This is moreover ſtrongly confirmed by the frequently repeated acknowledgements and thanks of the Britiſh colonies in America, expreſt by their principal inhabitants, governors, and even houſes of aſſembly: who have given the fulleſt teſtimony of their ſenſe of the benefits they have already ſhared, and hope yet to receive, from the Society's attempts to promote their intereſt. Perhaps, after all the eulogiums, or applauſe, that have been beſtowed on the Society, the utmoſt which has been aſcribed to the effects of their labours, either by thoſe who view them

th[illegible] a nearer or more remote ſituation, falls ſhort o[illegible] the real advantages they have produced, as well to our own country, as to the world in general.

The only ſeeming defect and remiſſneſs in the conduct of this Society has lain, in neglecting to uſe ſome effectual means to render more univerſal a proper notion of the merit of their proceedings, by ſpreading a more diſtinct knowledge of thoſe proceedings themſelves; and to communicate more generally thoſe acquiſitions of invention and intelligence, which have been gained by the moſt induſtrious application, and liberal expence. It is hoped, however, the ground of this ſpecious charge is now removed; and that an opportunity is obtained, of diſplaying for the future, in its full luſtre, the good which the public receives from the labours of this beneficent body; the ſupport of which ought to be earneſtly promoted by every friend of the Britiſh community, or of mankind.

In this intention of leading the public to do juſtice to the pretenſions of the Society, it were to be wiſhed, that a complete detail, or hiſtory of its tranſactions had been publiſhed. But that has been found, in ſome meaſure, impracticable, in the way formerly propoſed by the Society itſelf; and is now ſcarcely to be expected from any other quarter. A ſubſtitute for this work, comprehending the principal and eſſential part, is not, however, an impracticable undertaking; and may anſwer the end of it, both with reſpect to the public, and the œconomical intereſts of the Society. It is alſo neceſſary, for the elucidation of many articles which may demand a place in the contents of the following Memoirs, that what has been hitherto done

done by the Society with regard to them, ſhould be previouſly underſtood. There can be no doubt but that a knowledge of the paſt facts, which have relation to the objects of the Society's encouragement now depending, as well as of the final views and reaſons of proceeding, may be of utility in this light. And it may be productive of very beneficial conſequences, that the principal of thoſe others, where the Society has completed its deſign, and of courſe diſmiſt any further conſideration of them, ſhould be, in the ſame manner, enumerated and explained. Indeed, there is ſuch a connection, in many caſes, betwixt the preſent and former ſubjects of the Society's conſideration, that the one cannot be properly diſcuſſed without a retroſpection to the other.

I have therefore, as a previous introduction to the following memoirs, endeavoured to make a fair ſketch of the former proceedings of the Society, and their conſequences, as far as regards the capital articles of encouragement they have taken in hand. But I ſhall neither enter into an œconomical hiſtory of the Society itſelf, nor even a chronological account of the tranſactions; as they comprize matters that would, neceſſarily, be much too voluminous for, as well as foreign to, the preſent purpoſe.

In the early period of the Society, the ſmallneſs of the fund confined its regard to a few objects; though even among thoſe ſome were very conſiderable as to their conſequences. But the quick acquiſition of members, and augmentation of ſubſcription, ſoon enabled it to extend its views; and adopt a very comprehenſive plan; in which not only the number, but the importance of the ſubjects of encouragement, became very great.

To

To ſpeak with more diſtinctneſs and brevity of the particulars of theſe views, and the ſucceſs attending the purſuit of them, it may be proper to divide the objects of them into FIVE CLASSES. Theſe claſſes are not preciſely the ſame with thoſe formed by the Society in their premium book; which were founded very properly on the diviſion of the buſineſs with relation to ſix ſeparate committees: but they are better ſuited to a ſpeculative and general conſideration of the Society's proceedings. The objects of encouragement choſen by the Society, may, therefore, be ranged under the diſtinctions of *Polite Arts*, *Agriculture*, *Mechanical Arts*, *Chemical Arts*, and *Trade*.

SECT. II.

Of Improvements in the Polite Arts.

BY POLITE ARTS, according to the ſenſe in which the expreſſion is uſed by the Society, are meant, thoſe which depend on deſign and taſte; and are called by others the FINE ARTS. As the contents of theſe Memoirs will have but little concern with this claſs, I ſhall wave entering into the conſideration of any particulars of the Society's tranſactions relating to it further than to obſerve, that they have had a moſt amazing ſucceſs in their endeavours to promote the polite arts of every kind. Their *premiums* had firſt a very diffuſive and powerful influence on the youth whoſe genius were turned to ſtudies of this nature: and the incitement of emulation, ariſing thence, produced the moſt aſſiduous and ſpirited exertion of their talents. The introduction of the cuſtom of *public exhibitions* of all works of taſte, which was owing

owing entirely to the example ſet by the Society, completed what the premiums had begun: extending its effects to the oldeſt and moſt able artiſts, as well as the young, it has advanced, in a few years, almoſt every branch of theſe arts, to ſuch an approach toward perfection as was ſcarcely to be expected. At preſent, the operation of the premiums, for objects reſpecting the Polite Arts, is more confined than before this revolution in them; but they yet furniſh great incitements to younger and leſs eminent artiſts; and afford them the means of diſplaying dawning genius, or an eſſay towards perfection, in ſuch a manner as may introduce them more early and effectually to public notice, or private patronage; and, in this light, the Society's premiums may ſtill be deemed a conſiderable means of encouragement to the Polite Arts in Great Britain.

There is one branch of the Polite Arts the Society have taken under their encouragement; which, though it depends on deſign, is of a mixt nature, as being of the greateſt conſequence to commerce. This is, the drawing patterns and deſigns for ornaments: for ſeveral branches of which the Society have offered premiums.

The great advantage the French have over us in this particular both with reſpect to patterns for ſilk, paintings and ornaments for coaches, and deſigns, for every kind of furniture which makes the upholſterers buſineſs, renders it a matter of very great moment to us, and highly worthy the attention of a body, whoſe views are the promoting the commerce of this country.

The Society, therefore, early offered premiums in a general way to the youth of both ſexes, to encourage their application to the ſtudy of deſigns for

weaving and ornaments: and, in 1766, they alſo offered a premium of fifty guineas for the beſt patterns for weavers, by perſons of any age or ſex. This has been ſince continued to the preſent: and many claims have been made for it. But hitherto only divided parts of the premium have been given: there having been nothing produced adequate to the views of the Society. Though ſome genius, and effort towards improvement, have been diſplayed by ſome of the candidates. The Society have, alſo, this year offered a premium of fifty pounds for the beſt ſett of drawings of ornaments for the uſe of upholſterers: which, if it have a due effect, will be of very great conſequence to one of the moſt improving of our manufactures.

There was another article in the claſs of Polite Arts, for which the Society thought fit to offer ſome encouragement; that was, however, of a mixt nature as to the performance: having ſome dependance both on the Mechanical and Chemical Arts. It was, the *taking caſts or impreſſions of intaglios or cameos in paſte or glaſs of various colours.* The antients themſelves practiſed this art in great perfection; and have left us many fine ſpecimens of it. It had been revived in Italy; but was in general neglected here: though it is a means by which, the exquiſite performances of the antients may be exhibited to more general obſervation and ſtudy, as well for the improvement of the invention and taſte of artiſts, as for the gratification of others, who are admirers of excellence in works of deſign. Impreſſions of engravings of this kind, when perfectly executed, ſo much partake of the merit of the originals, that they may be conſidered, in fact, as multiplying them; and, conſequently, being the means of diſperſing them into a greater

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number of hands: and, alſo, as of preventing many of thoſe monuments of the antique taſte, from being loſt to the modern world: which may eaſily happen, by a variety of accidents in thoſe caſes, where there is only a ſingle original, or a very few of each kind remaining.

The Society, therefore, in 1760, offered a premium of fifteen guineas for the producing the greateſt number of ſuch paſtes, not leſs than thirty. This premium was continued to 1762; and then raiſed to twenty guineas for the greateſt number, and ten for the next greateſt; in which manner it was renewed the two ſucceeding years. The whole firſt premium was only twice obtained: and that by the ſame candidate; who, in 1762 and 1763, produced very ample collections of impreſſions, in glaſs, or vitreous compoſitions, of various colours, of antique figures, buſts, &c. as well cameos as intaglios; ſome of them very fine in the original, and well taken off in the impreſſion. In the year 1764, ten guineas, and five guineas, part of the firſt and ſecond premiums, were likewiſe adjudged to two other candidates for ſetts of impreſſions inferior to the former.

The Society having thus, by an offer of their premiums for five years, done all that could be towards the inciting an attention to this matter, then diſcontinued them. But ſince that time, ſome other ſpecimens were produced to the Society by an ingenious modeller: who has puſhed this art to a much greater degree of perfection. He not only takes off the impreſſions of cameos and intaglios in a very perfect manner; but he models portraits of living perſons in ſmall, even to the ſize of ſeals; and takes exact impreſſions from theſe models. He has attained, alſo, to the

art of uſing an opake dark glaſs for the ground, and a white one for the relief, in making theſe impreſſions; by which means, they are made to imitate, very cloſely, the antique cameos cut on laminated onyxes. It is hoped, this ingenious art will extend itſelf; as it not only affords the means of making durable repreſentations of living perſonages, of whom it may be wiſhed to have the likeneſs preſerved, but may, alſo, furniſh an elegant article of commerce, by producing, in the moſt cheap manner, either originals of perſons of diſtinguiſhed characters; or copies of antient fine intaglios or cameos, that will greatly ſhare the beauty of the originals.

SECT. III.

Of the Improvements in Agriculture.

THE improvement of AGRICULTURE is ever a matter of the greateſt conſequence, as well to each particular country, as to mankind in general. It is peculiarly important to us, as a commercial nation: the ſupport of our trade depending on our manufactures; thoſe manufactures on the rate of labour; and the rate of labour, in a great degree, on the price of the neceſſaries of life. The Society, therefore, very early embraced it, as one of the moſt conſiderable objects of their encouragement.

But, beſides theſe general motives, which always ſubſiſt, for promoting Agriculture, others yet ſtronger have ſince occurred, from the political and natural accidents, that have rendered proviſions of every kind diſtreſsfully ſcarce and dear with

us. Theſe circumſtances have greatly added to the merits of the Society's endeavours for the public intereſt, in this point. It will greatly tend to counteract the growing cauſes of the dearneſs of proviſions, that a fondneſs for farming and huſbandry has ſpread itſelf among perſons of property and liberal education: as it is they alone, who can give into the ſpeculation of improvement; and afford to make the requiſite trials and experiments. The Society's proceedings are a principal cauſe of the diffuſion of this taſte: and, at the ſame time, they have excited the deſire, they have pointed out, by the application of their premiums, the means of advancing the art of Agriculture in many branches: and of accommodating the practice to the public utility. The future advantages of this will be continually increaſing; and cannot fail, as we may conclude from the quick progreſs we now ſee, to have the moſt beneficial conſequences to our country; which, under the preſent circumſtances, has a peculiar need of every aſſiſtance of this kind.

In the claſs of Agriculture, one of the firſt objects, on which the Society fixt its views, was *the encouragement of planting foreſt-trees for timber*: and, as the good propoſed thence could only be gradually effected, they have, with great propriety, continued the premiums offered on this ſcore to the preſent.

The reaſons, which diſpoſed the Society to inſtitute the premiums for planting foreſt-trees, are very ſtrong; and may be evidently deduced from the conſideration of ſome clear facts. We are continually cutting down our woods and foreſts; ſometimes at a due maturity; but more frequently much before? Indeed, as to thoſe of a longer ſtanding,

if we were to ſpare them, the trees would ſoon decay; of which inſtances, to be much regretted, are to be ſeen in ſeveral of the royal foreſts. But the miſchief is, that while we are conſtantly deſtroying the old timber plantations, we are not making any proportionable ſubſtitution of new, to provide for a due ſucceſſion: whence this certain conſequence muſt reſult from our preſent neglect in planting, that there will, in time, be a great ſcarcity, or rather a total want of timber, of the harder kinds, of our own production, tho' indiſpenſibly neceſſary for ſhip-building, and many other purpoſes of the utmoſt conſequence. A correſpondent ſcarcity of wood for fuel, charcoal, pples, ſtakes, and other ſuch uſes, requiſite for manufactures and agriculture, and now afforded by the branches and underwood, will likewiſe of courſe enſue; and muſt thence occaſion manifold inconveniencies to the public. The cauſe of this remiſſneſs in renewing, or making plantations of foreſt-trees, takes its riſe principally from one circumſtance: which is, that the return of profit, according to the common management in making ſuch plantations, being ſo far diſtant, in conſequence of the ſlow growth of timber, the original diſburſement appears almoſt as ſo much property loſt. Such undertakings are, therefore, ſuitable only to perſons of great fortune, who can bear to ſink ſo great a ſum as is neceſſary for the carrying them into execution without inconvenience to their affairs; and to be content with the remote advantages that are to be reapt by their poſterity.

In order, therefore, to incite, among ſuch perſons, a ſpirit to engage more warmly in the enterprize of planting, the Society offered their medals of gold and ſilver, as premiums for various kinds

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under ſome proper conditions as to
of trees and manner of planting.
why the premiums were made of ſo
only in this caſe, is palpable, when
it is only perſons of fortune, on whom
they were intended to operate. They have accordingly had a conſiderable effect: ſince noblemen, even of the higheſt rank, have been ambitious to gain them; and have made their claims for conſiderable plantations, as appears in the liſt of premiums prefixed to this hiſtory.

It is preſumed, nevertheleſs, that the objection which ariſes, on account of the expence, to the planting trees, by thoſe who cannot afford to let the money diſburſed lye dead for a long term of years, will be, in a great meaſure, removed by the means pointed out in the obſervations, which will be given in theſe Memoirs, on the Society's premiums for planting particular kinds of trees; and by ſome other communications, that will be inſerted with reſpect to the moſt advantageous methods of planting various kinds of timber-trees. As means will be there explained of conducting ſuch plantations in a manner, by which, the capital employed will be ſoon regained; and a future profit acquired on the whole long before the timber-trees attain to their maturity; there is reaſon to hope, that this information will co operate with the Society's premiums; and produce at length the whole of their deſirable effect.

Another object alſo of the ſame nature was, ſome years ago, brought under the Society's conſideration: but, from the multiplicity of other engagements of their time and attention, which then happened, the proceedings on it were deferred; and, from incidental reaſons, have not been reſumed

till the preſent year. This object is the encouragement of *planting quick growing trees*; ſuch as the beſt kinds of willows, poplars, &c. that come to maturity in about thirty or forty years. A number of ſuch plantations might ſupply the wood wanted for many purpoſes; and, by keeping down, and lowering, the price of ſuch as is wanted for theſe purpoſes, would take away the temptation, there now is, for deſtroying plantations of young oak trees, on account of the immediate great return they afford, inſtead of keeping them till they gain the full maturity of timber trees.

The cultivation of ſuch quick growing trees may be performed in a manner that will yield a conſiderable profit in a few years; and a very great additional and final one at the expiration of thirty or forty. The probability of inciting much greater numbers to undertake ſuch plantations, than thoſe of oak, or other timber trees of ſlower growth; as well as the apparent utility of increaſing the ſtock of wood of any kind; have induced the Society to lend their attention to this matter, in which they may be of very eſſential ſervice to the public.

Another of the firſt articles, that had ſome relation to agriculture, which the Society undertook to encourage, was the *Cultivation of* MADDER *in England*. This may be conſidered as belonging to agriculture, from the kind and means of the produce: but it is of a double nature as to the intention. Since the advantages in a commercial light, which may be derived to the Britiſh community from the ſucceſs of the attempt, are much more conſiderable than thoſe which may be ſuppoſed to accrue to the planter in the light of a farmer.

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The root of madder is a capital drug uſed in dying wool, linnen and cotton; and indiſpenſibly requiſite in printing linnen and cotton: being the only red dye in general uſe for that purpoſe. It was, at the time when the Society firſt engaged in the encouragement of it, wholly imported from Holland: though it had formerly been a ſtaple article of produce in our own country. We pay annually for this root to the Dutch an exceeding great ſum; not leſs, according to calculation, than near three hundred thouſand pounds: and, what is ſtill worſe, taking the advantage of the neceſſity we are under to purchaſe it of them, they have not only advanced the price to an exorbitant rate; but adulterate and ſophiſticate the madder in ſo bad a manner, as lays our manufactures, in which it is uſed, under the greateſt difficulties. Theſe manufactures, moreover, in which it is abſolutely neceſſary, are of the utmoſt importance to us: particularly the printing linnen and cotton; which furniſhes employment to ſome thouſands of our women and youth; who would, otherwiſe, be waſte hands; and many of them burthenſome to the public. Nothing, therefore, could be more worthy the regard of the Society, than the introduction of the culture of madder here; which may tend to the national good ſo many different ways.

There was, however, at firſt, an almoſt inſurmountable impediment to the culture of madder in England. It conſiſted in this circumſtance, that madder being a crop raiſed on land, it was ſubject to pay tithe in kind: which was, in fact, ſo heavy a tax on the produce, as, together with the great expence and riſk, from the want of a more perfect knowledge of the manner of cultivation, almoſt intirely diſcouraged all attempts in a larger way. This obſtacle was, nevertheleſs, removed through

through the endeavours of the Society; by their obtaining an act of parliament, to change the demand of tithe in kind, to a modus, or compoſition, of five ſhillings per acre, for a term of years. The Society thus, by their interpoſition in this matter, procured the firſt opening to that ſucceſs, which is now likely to attend the attempts, to reſtore the production of this important article to our country.

The Society, in the mean time, exerted themſelves to incite the attention and ſpirit to undertake the culture of madder by premiums. The firſt they offered was for the producing twenty pounds weight; the moſt perfect, and beſt cured. This was obtained in the year 1755. They then, being by this means aſſured, that a method was known in England of raiſing and curing good madder, propoſed premiums for the largeſt roots, twenty in number, of one, two, or three years growth: which were accordingly claimed and obtained for each kind, in the year 1758; and again in 1759.

They now proceeded to offer a premium of fifty pounds for the greateſt number of acres, not leſs than ten, planted with madder and duly cultivated. This was accordingly claimed, and obtained in 1761.

The cultivation of madder having now made ſome progreſs, the Society, in 1762, appropriated five hundred pounds to be given at the rate of five pounds for every acre, provided that ſum ſhould be ſufficient to afford it for all the claims: or otherwiſe, that the whole ſhould be divided among the candidates according to their reſpective number of acres. This premium was claimed, from 1763 to 1767 incluſive, with various quantities;

ities; but never to the amount of the whole premium offered: which, nevertheleſs, might have been reaſonably hoped from ſo fair a proſpect in the beginning; and ſuch conſiderable encouragement.

In 1763, there were ſeventeen claims made, and now allowed to be juſt; which were in all for ſixty-nine acres. In 1764, there were ſixteen claims made and allowed; which were in all for forty-five acres. In 1765, there were fourteen claims made and allowed; which were in all for thirty-five acres. In 1766, there were fifteen claims made and allowed; which were in all for thirty-ſix acres. The report is not yet completed with reſpect to the claims for the year 1767; but the whole of them is conſiderably more than in the two preceding years. The total expence of the Society, from the firſt diſpenſation of premiums for the madder, to the year 1766 incluſive, has been 1111 l. beſides a medal. Of this, 188 l. was given before the premium was offered for every acre. The other 923 l. has been given for 185 acres; of which the greateſt quantity that was ever claimed in one year, by the ſame perſon, was twenty-nine acres, in 1763; and the next greateſt, fifteen acres, in 1764, and 1766.

The reaſons why the cultivation of this plant, notwithſtanding the noble efforts of the Society to eſtabliſh it, did not increaſe, were various: and poſſibly a great part of them owing to erroneous notions, and a leſs perfect knowledge of the beſt method of culture.

The number of plants thought neceſſary, the Society requiring twenty thouſand on each acre, was perhaps one diſcouragement; as it augmented the expence conſiderably: the plants being at firſt of the price of one guinea per thouſand, and ſince half

half a guinea. But it is believed by very great judges, that half the number are ſufficient; and, in the laſt premium, the Society have not directed any particular number of plants.

The very great depth of ſoil ſuppoſed to be neceſſary was another diſcouragement: as ſome imagined three or four feet depth was indiſpenſible. Whereas good madder is raiſed on land, ſuitable in other reſpects, from ſixteen inches to two feet.

The notion, that crops of madder impoveriſhed and exhauſted land on which it was cultivated, was, alſo, another difficulty which ſtood in the way of the increaſe of the culture of it. For the proprietors of proper land, which, according to the above-mentioned notion of great depth of ſoil, was only to be found in particular places, would not let it but on long leaſes This greatly encumbered the planters of madder: who, after they had obtained two crops, had no longer any uſe for the land; and were obliged to let it again on diſadvantageous terms. But ſuch a caution in the proprietors of land was without foundation. For, though it was impaired after two crops, and conſiderably exhauſted after three, with reſpect to the further production of madder, it was ſtill no way injured by the crops of madder for the production of corn, or graminеous plants; which only derive their nutrition from the ſoil a little below the ſurface. On the contrary, if the land had been before worn out by crops of that kind, it would be improved by the culture of madder: which would produce the ſame effect as trench-plowing; of which the benefit is well known in ſoils of conſiderable depth.

Theſe reaſons, and the want of a more perfect knowledge of the profitable methods of cultivating

ing and curing madder, together with the expences originally attending it, diſcouraged farmers, and perſons concerned in common affairs of agriculture, from readily going into this matter, and prevented ſo quick a progreſs of it. But happily thoſe quantities, which were, nevertheleſs, raiſed, occaſioned a thorough conviction of the ſuperiority of our madder to that brought from Holland: which, with the exorbitant price, as well as uncertainty of quality, of the Dutch, that had of courſe the operation of a premium, has determined many of the conſumers of madder to turn their views to this important matter; and undertake themſelves, to raiſe what they have occaſion to uſe.

In conſequence of this, it appears, that the claims made on the Society the laſt year for the premium, are much more numerous than in the preceding years: and, as the future premiums offered for this article are put on a much better footing than before; and meaſures are taken for procuring information of the beſt method of cultivating this plant, and preparing the root for the market, in order to aſſiſt thoſe who might be otherwiſe deterred by finding difficulty in procuring ſuch intelligence; it is not to be doubted, but that the Society will, by this means, complete what they have ſo nobly begun.

There has, indeed, one very beneficial conſequence already reſulted from the ſteps that have been taken: which is, that the Dutch have been deterred by them from the raiſing the price of this commodity, ſo neceſſary to us, to a ſtill greater height. For the States themſelves, ſenſible of the ſtrong reaſons for keeping this article out of our hands, have checked, as far as they could, by the

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ſtricteſt prohibitions, the depraving it, when ſent to our market, by adulteration.

Should the eſtabliſhment of the production of this momentous article in our own country, be at length brought to bear, as there is now the greateſt ground of hopes it will, the whole merit of this invaluable acquiſition muſt be aſcribed to the Society. They took the encouragement of it upon them, at a time when the former miſcarriages of private perſons had occaſioned the purſuit of it to be wholly neglected, and laid aſide; and they have continued to proſecute the deſign with the moſt aſſiduous attention, and an expence of more than eleven hundred pounds, beſides the premiums of the laſt year, and five hundred pounds offered at preſent.

The next great object after madder, in the claſs of agriculture, to which the Society turned their attention, was the encouragement of *the production of* BEES-WAX *in England*. This article does not, ſtrictly ſpeaking, belong to agriculture: but, being a matter to be practiſed principally by farmers, and thoſe who are concerned in huſbandry, it was conſidered as belonging to that claſs. The large conſumption of bees-wax for candles, which is a luxury daily increaſing, affords juſt room for very ſerious conſideration: as almoſt the whole of it we uſe, is purchaſed of foreigners by our money. The ſeeming poſſibility that we might ourſelves produce a great part of what we uſe of this commodity, and ſave a very conſiderable national expence, gave riſe to an intention in the Society, to endeavour, by premiums, and other means, to promote the increaſe of bees in our country.

They, accordingly, in the year 1761, offered a gold medal to the perſon who ſhould erect, on or

for before the firſt day of September in the ſame year, the greateſt number, not leſs than thirty, of hives or boxes ſtocked with bees: and, for the next greateſt number, not leſs than twenty, a ſilver medal. They, at the ſame time, advertiſed the like premiums for the years 1762, and 1763. The gold medal was obtained in 1762 for two hundred and twenty-three ſtocks, and the ſilver one for one hundred and ten. And again by the ſame candidates in 1763.

In 1763, finding honorary rewards not to have the full effect deſired, the Society added a pecuniary premium. This was eighty pounds, to be given to the perſon who ſhould have in his poſſeſſion, being his own property, on or before the firſt day of September, 1764, the greateſt number of ſtocks of bees in hives, or boxes, not leſs than four hundred; to the next greateſt number, not leſs than three hundred, fifty pounds; to the next, not leſs than two hundred, thirty pounds; and to the next, not leſs than one hundred, ten pounds. The gold medal was accordingly claimed in the year 1764, by the ſame candidate as obtained the two former, for one hundred and eighty-two ſtocks; and the ſilver medal by a new candidate, for one hundred and five ſtocks. The fourth pecuniary premium of ten pounds was alſo claimed for one hundred and fifty ſtocks. The higher premiums were not claimed: nor does it appear, in the Society's books, that any perſon had ever a greater number than that of the gentleman who obtained the three gold medals, whoſe greateſt number of ſtocks, which was in the firſt year, amounted to two hundred and twenty-three.

In the year 1765, the Society offered a further pecuniary premium of five pounds, to every perſon who ſhould have, on the firſt of February 1766, any number of ſtocks of bees, not leſs than thirty; provided the claims ſhould not amount, in the whole, to more than two hundred pounds; in which caſe the ſum of two hundred pounds was to be equally divided among the candidates.

To this laſt premium the Society joined, in the ſame year, another pecuniary premium, reſpecting the management of bees, which was thought expedient on the following principle. It was conceived, that one proper method of increaſing the number of ſtocks, was to avoid the deſtruction of the bees when the wax was taken from them: which is almoſt conſtantly practiſed in the common method, where the bees are previouſly killed. In order to encourage the propoſed change of conduct in this point, the Society purſued theſe means. They procured a model of an apparatus for taking away the honey commodiouſly without any injury to the bees: and they inſerted in their advertiſements, that any perſon deſirous to treat bees in this manner might ſee this apparatus in the Society's office. The premium they offered, on this account, was five pounds to every perſon, who, within the year 1767, ſhould collect from ſtocks of bees, of his own property, ten pounds of clean merchantable wax, without deſtroying the bees, leaving a ſufficient quantity of honey for their winter ſuſtenance; but, in caſe the whole of the claims ſhould amount to more than two hundred pounds, then that ſum to be divided among the candidates.

The claims made and allowed, for the premiums for having above thirty ſtocks of bees, were by twenty-

twenty-one perſons: the number of whoſe ſtocks taken together amounted only to nine hundred and nine. This ſeems to evince, inconteſtably, that the production of wax is greatly neglected in England, either from ſome difficulty, or uncertainty, that diſcourages the purſuit; or from want of adequate profit in a country, where the great circulation of money makes objects, that are of ſmall conſequence with reſpect to particulars, be too much diſregarded.

The time of the claims for the preſerving the bees is alſo now expired: and the effect of the premiums appears to be very inconſiderable. There were only ſix candidates: who, all together, produced only ſixty-eight pounds and a half of wax. But it is an undecided queſtion, whether the deſtroying, or ſaving, the bees be the moſt advantageous method. An opinion prevails amongſt thoſe, who are acquainted with the natural hiſtory of bees, that, like other ſpecies of flies, they are in a great meaſure of an annual exiſtence: and that part die the firſt year; and the others are, after that time, weak, and unprofitable, compared to freſh ſtocks. Moreover, when the bees are not deſtroyed, the advantage of the honey, which makes the greateſt part of the preſent profit of keeping bees, muſt be given up in a conſiderable degree. It was, however, a matter not unworthy examination: and the Society's premiums were the moſt effectual means to obtain any ground for a deciſion of this queſtion.

The production of wax in our own country is certainly a great national concern, if it could be effected: and the public are obliged to the Society for this ſpirited attempt, whatever may be the reſult of it: as they appear to have taken great

pains in the conſideration of the mode of their premiums; and have appropriated very liberal ſums to them. But they have, with very juſt reaſon, now diſcontinued their premiums for this article: as they were found to be very ineffectual. Since, by the offer of two hundred pounds in one premium, beſides the others which were concurrent with it: and the actual expence of one hundred and five pounds given laſt year, to the claims for that premium; they did not procure, at the moſt, above twelve or thirteen hundred pounds weight of wax: which cannot be valued to the public at more than ſixty-five or ſeventy pounds ſterling. This is evident in the following calculation. Let the quantity of wax be rated, one ſtock with another, at one pound and a half for each ſtock. This is the moſt which can be allowed: becauſe five of the candidates, who took the wax without killing the bees, appear, from their certificates, to have obtained in the whole only fifty-ſeven pounds and a half of wax, from fifty-ſeven ſtocks of bees, which is only one pound and the fifty-ſeventh part of a pound from each ſtock. So that allowing a pound and a half to each, is much more than is warranted from the product of the fifty-ſeven ſtocks. The price of wax imported cannot be rated at above a ſhilling a pound: but, to give the queſtion the utmoſt fair play, we will take that to be the rate. The claims on the Society were, for nine hundred and nine ſtocks; which, according to theſe premiſes, we will ſuppoſe to have produced each one pound and a half, worth one ſhilling per pound. Therefore the nine hundred and nine ſtocks produced thirteen hundred and fifty-three pounds and a half of wax, worth ſixty-ſeven pounds, thirteen ſhillings, and

ſix-pence.

ſixpence. As we may preſume that the greateſt part of thoſe who were intitled to this premium, by having above thirty ſtocks of bees, claimed it of the Society, we may hence infer, the very ſmall quantity of wax produced in England. For there are ſingle apiaries in Germany that conſiſt of four times the number of all the claims; and, if we make the largeſt allowance for the ſingle ſtocks, or for the number that may be together, under thirty, we ſhall find the whole muſt be very trifling. It muſt be remarked alſo, that the honey, for the quantity of which that is now produced, there is ſuch a demand as keeps it at a moderate price, is the principal return to thoſe who keep bees. But if the quantity of it produced were ten times as great, which would not yet render the quantity of wax a conſiderable national object, this encouragement would be taken away. For there being no uſe or demand for ſuch a quantity of honey, the price of it would of courſe fall extremely low. So the production of wax may well be deemed an hopeleſs object of public encouragement in our country, during its preſent ſtate.

The extending *the Culture of* HEMP *in England* was conſidered, alſo, by the Society, as a capital object of encouragement in the claſs of Agriculture. There are two reaſons which make the production of this article, in our own dominions, a matter of very high importance. The one is, that we pay very great ſums for hemp to foreign countries where the ballance of trade lies againſt us. The other is, that beſides its being ſome way or other uſeful in almoſt every manufacture, and conſiderable work; it is an indiſpenſible material for ſails and cordage, in the conſtruction, as well of ſhips of war, as trading veſſels; and, therefore,

ſo abſolutely requiſite both for our defence and trade, that we ought to neglect no method of avoiding this dependance on means of ſupply which are ſo precarious, as the purchaſing and importing it from other countries. A means to which, it is poſſible, the greateſt difficulties may be thrown in the way, by the contrivance of artful enemies, at ſome critical period.

The Society, induced by theſe motives, as we ſhall ſee below, firſt begun to attempt the removing this deficiency in our commercial ſyſtem, by offering premiums for the production of hemp in the colonies. But, as the progreſs of the culture of hemp there, muſt be gradual; and we cannot expect them ſoon even to provide for their own conſumption, much leſs for ours; it was propoſed alſo, to offer other premiums for the encouragement of the production of this article in England, in order to revive the attention to it which appeared to be declining.

Accordingly, in 1761, ſeven hundred pounds were allotted for the whole of the intended premiums: and divided into ſeven parts, to be diſperſed in ſeven diviſions of the counties in England, on theſe conditions: To the perſon in each diviſion, who, in 1762, ſhould ſow with hemp the greateſt quantity of land not leſs than twenty acres, plucking the ſummer crop, and leaving the ſeed crop on the ground till the ſeed be ripe, forty pounds: to the ſecond greateſt quantity, not leſs than fifteen acres, thirty pounds: to the third greateſt quantity, not leſs than ten acres, twenty pounds: and to the fourth greateſt quantity, not leſs than five acres, ten pounds. Theſe premiums were renewed for three ſucceeding years.

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In 1762 the claims made and allowed were for 26, 15, 14, and 12 acres, and ſome fractions of acres, by four candidates. In 1763 the claims made, and now allowed juſt, were for 43, 35, 31, and 19 acres, and ſome fractions of acres, by four candidates. In 1764 the claims made, and allowed, were for 37, 29, 18, 15, and 10 acres, and ſome fractions of acres, by five candidates.

The whole of the candidates, which claimed theſe ſeveral premiums, were only ſeven in number: ſome of the ſame candidates claiming for more than one year.

It appears from hence, that the whole claims in the firſt year were for 107 acres: thoſe in the ſecond for 128 acres: and thoſe in the third for 124 acres: that the greateſt quantity cultivated by any one perſon was 66 acres: that the whole of the quantities in each year did not vary in any ſignificant degree: that the whole quantity which claimed was inconſiderable, in the light of a national object: and that the number of acres claimed for in the laſt year, was leſs by four than in the preceding year.

Theſe premiſes clearly evince, that the Society's premiums produced no material effect: and, therefore, after ſo fair a trial, they very properly diſcontinued them. The reaſon, why the culture of hemp is more neglected now than formerly, is ſuch as is not to be counteracted by means of that kind. It evidently conſiſts only in this, that ſince the advance of the rate of labour, and the price of manure, the farmer can employ his land and ſtock more profitably, for the moſt part in the culture of corn, or other articles, than of hemp; and, indeed, it may admit of ſome doubt, whether a great increaſe of the quantity of hemp

cultivated, would not be rather a detriment than an advantage to the public: as it would, in proportion, leſſen the quantity of proviſions produced, the dearneſs of which is the greateſt œconomical evil that attends us at preſent.

There are, however, ſome circumſtances in which the cultivation of hemp, in a certain proportion, may be very beneficial, as well to the farmer as the public. When any perſon concerned both in tillage and paſture has, in conſequence of holding very good land, ſuch a quantity of manure, that, without diſadvantage to his other undertakings, he can ſpare a part of it; and has alſo the command of hands on cheap terms, at a proper time of the year, for curing and dreſſing the hemp; he may cultivate a ſuitable quantity of it with due advantage. Other farmers, alſo, who have hands in their families, or ſervice, that are devoid of employment in winter, may, with profit, cultivate juſt ſo much hemp, as will find work for them, in the dreſſing, or manufacturing, of it: ſince the return for ſuch work makes ample amends for any diſadvantage in the culture, compared to that of other articles. But, theſe; or the occupation of land, peculiarly ſuited to the production of hemp, by the nature of the ſoil, or plenty of ſome proper kind of manure in the neighbourhood, joined to the opportunity of obtaining the aſſiſtance of cheap labour; are the only caſes where the culture of it can be advantageous, either to the public, or the undertakers.

The truth of what is here advanced appears, indeed, from the ſmall number of claimants of the Society's premiums: ſince it is thence evident, the far greateſt part of the hemp, which is now cultivated in England, is raiſed in little quantities, as

here

here propoſed. For, though the leaſt premium demanded no more than five acres, there were only ſeven perſons, who brought claims, in the whole three years the premiums were continued. People who are concerned in any undertakings of buſineſs, naturally adopt what they find is profitable, and ſhun what is diſadvantageous, as far as they underſtand it. It is no wonder, therefore, that producing larger quantities of hemp is attempted only in few places: but the culture of it even under thoſe circumſtances where it might be more generally beneficial, is confined alſo to particular parts, though it would be ſuitable to many others. The reaſon ariſes merely from the want of knowledge of the profit that might accrue; or of examples of ſome to incite others. This deficiency would be beſt removed by the encouragement of gentlemen to their tenants, to introduce the practice of cultivating as much hemp as would occupy the waſte time of hands in their families: which would enable them to pay their rent; and contribute to the habit of induſtry in the individuals of the families. As the defect of knowledge of the proper methods of cultivating, and dreſſing hemp, is, therefore, one great cauſe, in many places, of the neglect of it; the ſupplying ſuch knowledge is of courſe a more efficacious means of promoting the extenſion of this article in the right way, than any premium could poſſibly be. It is, at preſent, under the conſideration of the Society to procure the beſt information on theſe points: which, or whatever lights, may be obtained by other means, will be hereafter communicated in this work.

Before I diſmiſs this ſubject, it may not be uſeleſs to remark here, that the ſucceſs of the Society's premiums with reſpect to hemp, is one of thoſe inſtances, which ſhew to what kind of objects they ſhould direct their views. When they have attempted the producing the invention of uſeful matters, either of a mechanical or chemical nature; the procuring information of ſuch beneficial things as were already known in particular places only, or were to be brought to light by juſt ſpeculative obſervation, or actual experiments or trials; or the introducing into practice new articles, or improvements in the treatment of thoſe eſtabliſhed, by the communication of uſeful knowledge reſpecting them; they have always reaped ſuch fruits, as have afforded honour to themſelves, and emolument to the public. On the other hand, when they have made efforts to incite the more general undertaking of matters already known, merely by force of money, they have moſtly miſcarried. The claims of their premiums have, however, ſupplied ſuch a detail of facts with reſpect to the ſeveral objects, as may be the means of judging with more certainty of the ſtate of the reſpective articles in England: which may be of future utility in the political meaſures, that may be taken with regard to our commercial ſyſtem.

The fifth great object of encouragement in the claſs of Agriculture, which the Society adopted, was the cultivation of *Foreign* GRASSES, or ſuch other HERBS, or ROOTS, as might increaſe the national ſtock of *Food for Cattle*, with profit to the planter. In this light *Lucern*, *White Clover*, *Parſley*, *Carrots*, and *Parſneps*, were recommended by the offer of premiums.

LUCERN,

LUCERN, in particular, was conſidered as meriting the moſt careful diſquiſition. The great advantages, which it is well known, the French and Swiſs receive from the cultivation of this plant, render it well worthy an experimental regard in our country, where every aid to the increaſe of cheap paſturage is more wanted than with them. And, with relation to the probability of lucern's ſucceeding here, there appears no ſpeculative reaſon, why a plant that will endure the ſtrongeſt froſts; grows ſo well in the northern provinces of France, as to ſupply the greateſt part of the hay conſumed in Paris; and is found very beneficial in Flanders; ſhould not thrive, and be profitable, in our country, under due management. The Society had, therefore, the juſteſt grounds for endeavouring to procure all poſſible experiments to be made of the culture, produce, and uſe, of this plant with us; and from ſome very concluſive obſervations made in conſequence of trials in a large way; which will be inſerted hereafter in theſe Memoirs; it will be evident, the premiums for this plant have been inſtrumental in procuring hence a very great national improvement in paſturage.

The utility of *Cultivating* CARROTS *for feeding Cattle*, has been likewiſe manifeſted, by means of the Society's premiums for them. Particularly, through the extenſive and judicious trials made of them, by Mr. Robert Billing, at Weſenham, in Norfolk, who obtained the Society's premium for cultivating thirty acres and an half at one time; and whoſe very ſatisfactory account of the uſe of the carrots produced, in feeding neat cattle, ſheep, horſes, and hogs, was publiſhed, by order of the Society, in 1765, and republiſhed in the *Muſeum Ruſticum*, Vol. V. It appears hence, that

that both from the quantity of the product, and the exceeding wholeſome and nutritive qualities of carrots, with reſpect to beaſts of all kinds, they are one of the moſt valuable articles of culture hitherto known. The premiums for them are now diſcontinued by the Society, on account of its being preſumed, that the end is entirely anſwered: as their utility has been ſo well demonſtrated to the public.

The premiums for WHITE CLOVER were offered for raiſing the ſeed in England. This was done not only on the ſcore of the excellence of this herb, in the improvement of paſture by mixt graſſes; but becauſe we import annually great quantities of the ſeed from Holland. This premium was claimed in 1764, for one tun, one hundred and fifty-five pounds weight; and, in 1765, for one thouſand and nine pounds weight. The end of the premiums for white clover ſeed, which was principally to excite ſome attention to this matter in the public, ſeeming to have been thus anſwered, they are now diſcontinued.

There was never any claim made for the premiums for PARSNEPS: and the Society have therefore now ceaſed to offer them. It were to have been wiſhed, however, that ſome ſufficient trial had been made of their utility, compared to that of carrots. They grow very large in ſome ſoils; and the ſweetneſs of their taſte, ſhewing they contain more ſaccharine juice than carrots, there can be no doubt of their being more nutritive to ſtock, beaſts, as they would well agree with. They promiſe to be particularly ſerviceable in feeding hogs.

The premium for PARSLEY has been alſo diſcontinued by the Society for the ſame reaſon, as that

that for the parſneps; viz. to make room for articles that may be more readily attended to than theſe appear to have been.

This purſuit of the general improvement of paſturage led to another more particular, but very important ſpeculation. It was, *the diſcovering a* WINTER PABULUM *(as it was called by the gentlemen who ſet on foot this matter) for* CATTLE; or, in other words, ſome plant or plants of which the herb or root would afford a profitable crop, and ſtand till the middle of the ſpring, in ſpite of the ſevereſt froſt, ſo as to be a certain dependance when the ſtock of hay, or other dry food, ſhould fail. The obſervation, that the preſent greateſt defect in paſturage lay, in not having any kind of herb or root, in common culture, that would fully anſwer this end; and the probability of finding out ſome ſuch; were the grounds of this undertaking. It is obvious, that the greateſt diſtreſs we ſuffer in the temporary ſcarcity, and high riſe of the price of proviſions, is principally owing to this circumſtance. In ſeaſons when the crops of hay fall very ſhort, and ſucceeding long froſts lock out the aid of green herbage or roots, the farmers and graziers are obliged to kill off a great part of their ſtock cattle, for want of the means of providing food for them. This injury to their ſtock, cannot be repaired by a proper recruit under a long time: and, conſequently, in the ſucceeding years there will be a deficiency of the number of ſle brought to market. The procuring, therefore, ſome preventive means againſt theſe very detrimental conſequences of an impropitious ſeaſon, is a matter of the greateſt advantage, as well to the public, as the grazier or farmer. The uſe of turneps has been, a conſiderable time ago, introduced

duced for this end: and ſome maintain, that it is ſufficient to anſwer the purpoſe. But whoever conſiders how uncertain the producing a good crop of turneps is, on account of the fly, and other accidents; and how liable they are to be deſtroyed by great wet, and yet more by long and hard froſts, the very circumſtance under which the great want of them occurs; muſt be convinced of the error of ſuch an aſſertion, by the moſt evident reaſons. Indeed the very fact proves itſelf. For we have lately ſuffered greatly on this account, notwithſtanding the uſe of turneps.

The Society, urged by theſe very juſt motives, took the utmoſt pains in this matter; and employed all the means, that could be deviſed, to gain information of whatever could lead to the diſcovery of a preventive remedy for this evil. Their ſecretary was directed to write to the perſons diſtinguiſhed for knowledge in matters of this kind, in every part of Europe; to enquire what was the practice in their reſpective countries as to this point; and to beg, alſo, their private opinion regarding it. Anſwers were duly received from them: but without ſupplying ſuch lights as might have been hoped for. The ſentiments, likewiſe, of the moſt able perſons at home were given on this ſubject: and the turnep cabbage, brocole, white Chineſe vetch, Siberian medicago, furze, and ſome others, were recommended, as plants that would anſwer this end.

Among the reſt of the herbs propoſed as fit for this purpoſe, Mr. Roque, a gardener offered BURNET, as being peculiarly ſuited to this uſe from its copious product, early growth in the ſpring, great hardineſs, and the retention of its living

living ſhoots, and even vegetation, in winter. The Society were prevailed upon by the appearance of ſpecimens, examined at different ſeaſons of the year, to believe there was a proſpect, this plant might prove in a great meaſure, what they ſought for, as a winter pabulum for cattle: and in order that due trials might be made, they offered premiums for the cultivation of it. Theſe premiums had the deſired effect. For claims were made for many parcels, ſome not leſs than thirty or forty acres, by gentlemen who gave very favourable accounts of the plant; particularly of its hardineſs and uſe in froſts; and of its nutritive quality, evinced by the quantity and richneſs of the milk of cows fed with it, even in the midſt of winter. A diviſion of opinion, nevertheleſs, prevails amongſt thoſe who have moſt cultivated this plant, as to its comparative utility with others cultivated for the ſame purpoſes. But it is certain, from letters received by the ſecretary to the Society, that the cultivation of this plant is extending itſelf greatly, both in ſeveral counties of England and in Germany, gaining conſiderable eſteem, particularly in ſome parts of Lincolnſhire and Suffolk. Among other good qualities attributed to it, there is a prevailing notion in ſome places where it is now much cultivated, that it is both a preventive and curative remedy for rot in ſheep. Should this prove true in fact, the culture of burnet would be a moſt valuable acquiſition to agriculture: but I ſpeak of it only on the authority of the contents of the letters, I have juſt now mentioned. The Society have, however, now left it to future obſervations and trials, to determine the merits of this plant, cultivated on good land. Having procured a ſufficient train of general experiments,

periments, by the continuance of their premiums for ſeveral years, they have now changed the mode of them; and made them depend on planting the greateſt number of acres, the land being the worſt reputed ground in the neighbourhood. They were induced to offer premiums, for the cultivation of *Burnet*, on this condition, by ſeveral repreſentations, that crops of it had been obtained on very bad land: the aſcertaining which point was certainly a very material object. For it would doubtleſs be a matter of conſiderable utility to know, that a good crop of any herbage, that was an agreeable and nutritive food for cattle, and durable for ſeveral years, could be raiſed with a ſmall expence on bad ground: eſpecially being of ſuch a kind as will ſtand the winter, and be a certain reſource in ſevere ſeaſons. However this may prove, one fault muſt be admitted in burnet: which is, that in ſome particular places or ſoils, it is ſo diſagreeable, both to ſheep, horſes, and other cattle, that they will not be inticed, by any means, to make it their food; but will rather ſtarve than taſte it. It is proper, therefore, to be well informed of this, by trials of ſmall quantities in every freſh place where burnet is to be cultivated, before large undertakings be entered on: otherwiſe a conſiderable loſs may accrue on this principle.

The Society have, alſo, more lately propoſed premiums for two kinds of plants, before mentioned, of the cabbage tribe, the *Turnep Cabbage* and the *Borecole*. They were partly determined to this by the accounts of Mr. Wynne Baker's experiments in Ireland, publiſhed in his report to the Dublin Society for the year 1765, and inſerted in the *Muſeum Ruſticum*, Vol. V. The proſpect of bore-

borecole's anſwering the ends of a winter pabulum for cattle ſeems greater, in ſome reſpects, than that of burnet: as its produce is well known to be a profitable crop; and it is never liable to be deſtroyed by keen froſt or rain. But the durability of burnet is, it muſt be admitted, a circumſtance of great weight in the computation. The turnep cabbage and borecole have the ſame advantage over turneps: and another over them, and all roots or trailing herbs, that lye on the ground; which is, that being erect they can be eaten by, or cut for the uſe of, cattle though the ground be covered with ſnow of a moderate depth.

The premium for the turnep cabbage was claimed, laſt year, by a gentleman, who gave the moſt promiſing relation of its uſe and value. He has, alſo, obtained the ſame premium again the preſent year; and confirmed in the laſt account what he had ſaid of the utility of this plant in his former. Both theſe accounts will be found below in theſe Memoirs. But there were ſome inſtances laſt winter of this plant's ſuffering by the froſt.

The premium for *Borecole* was offered ſince that for the turnep-cabbage: and no claim has been hitherto made for it; probably from the little acquaintance of the public with this plant, and the difficulty of procuring the ſeed, at leaſt ſuch as can be depended upon. But an account will be found below of the nature, cultivation, and uſe of it: and Mr. Shields, nurſery-man, at Lambeth, in Surry, having undertaken to the Society, to ſupply, in a perfect ſtate, all ſuch plants, roots, cuttings, or ſeeds, of ſuch articles as they ſhall offer, or have offered premiums for; it is not doubted but that this plant will, as well as the turnep cabbage, meet with a fair trial; and prove very beneficial, under many

many circumſtances, as a winter or ſpring food for neat cattle and ſheep. As borecole may be depended upon, as a reſource, in the moſt rigorous ſeaſons, when almoſt all other herbage is deſtroyed or buried in ſnow.

There is another plant of the cabbage kind called the COLEREED, which is very hardy, and is now cultivated in ſome parts of ſeveral counties for the purpoſes of feeding cattle and ſheep in winter. The Society has endeavoured to procure, by the offer of premiums this year, information of the beſt manner of culture, and the expence, produce, and uſe, of this [illegible] that a compariſon may be made of it with the turnip cabbage and borecole, in order to determine which has the general ſuperiority, or in what particulars one may be preferable to the other. A more detail explanation of the nature, and culture of this plant, will be below given in the obſervations on the Society's premiums now offered.

The procuring *the ſeparate Collection, and Cultivation of the moſt valuable kinds of* ENGLISH GRASSES, was another very important view with relation to agriculture, which the Society entered into: and their endeavours with regard to it, have been attended with ſuch ſucceſs, as has fully anſwered the ends propoſed. The merit of the Society with reſpect to the good produced by it to the public, is leſs conſpicuous to the world in general than ſome other points, though not leſs real. The reaſon of this is, that the ſubject, though very momentous, is more obſcure. Becauſe, in order to judge of the very great advantages, that may hereafter be reaped from this matter, it requires a previous conſideration of ſome particulars, which do not occur in common and ſuperficial obſervation:

ation: though they may be eaſily comprehended, when preſented in a clear light, and duly attended to.

It is well known, that ſome kinds of graſſes are better ſuitable than others to particular ſoils: and likewiſe equally ſo, that ſome are fitter than others for particular purpoſes. It is certain, alſo, that the various kinds of graſſes differ, even ſome months, in their earlier or later vegetation, and arrival at maturity: and, conſequently, that ſome are in the moſt perfect ſtate for making hay long before others. It is equally true, likewiſe, that graſs ſeeds of any particular kind ſown free from the ſeeds of weeds, and in a copious quantity on a ſoil favourable to them, will riſe with very few weeds: and thoſe few will be moſtly of a rank and ſtrong kind, that ſhew themſelves above the graſs; and may be extirpated before they again produce ſeed: the ſmaller and weaker weeds being, in this caſe, overcome by the quantity and luxuriance of the graſs itſelf. Theſe circumſtances evidently indicate, that in order to have a paſture, when freſh laid down, ſoon full of good and durable graſs, free from weeds, it ſhould be ſown with graſs ſeeds of the particular kinds, which will beſt ſuit with the ſoil; and have no mixture of the ſeeds of weeds with them. The ſame holds equally good as to the repleniſhing older paſtures with freſh graſs by means of ſeed: which if bad, will fail of its effect; and if mixt with the ſeeds of weeds, will of courſe fill the paſture with them. It is alſo a clear inference from obvious facts, that, where a particular ſpecies of graſs is wanted, for any required purpoſe, free from all the other kinds, ſuch graſs muſt be raiſed by cultivation; except when it abounds

greatly in the place, where there is occaſion for it; which rarely happens.

But, notwithſtanding theſe palpable reaſons for attention and care, as to the choice of graſs ſeeds to be ſown, the univerſal practice has been hitherto diametrically oppoſite to theſe principles: and a total neglect of regard to every one of them has prevailed.

When graſs ſeeds are wanted either to lay down paſtures, or recruit them with freſh graſs, they are always taken from the ſheddings of the hay in the loft or ſtack: and generally without any regard to the place whence the hay was obtained, the maturity or other qualities of the ſeed itſelf, or the commixture of that of weeds with it. Hence, from the uncertainty of the fitneſs of the graſs, this ſeed will produce, to the nature of the ſoil, where it is ſown; as well as of the real quantity of fertile ſeed, from the varying maturity of the graſs whence the hay was made, and from the mixture of weeds frequently the moſt noxious; a very great uncertainty ariſes of the crop of graſs produced; together with the chance of having it accompanied with the moſt troubleſome weeds: many times, ſuch as were ſtrangers to the place before they were thus introduced; and are ſcarcely to be eradicated, but with the deſtruction of the graſs itſelf. By this ſlovenly method of management, many paſtures are always in an ill condition; and moſt others require a long time after they are laid down, before they be well covered with good graſs: whereas, if they were ſown with a quantity of proper clean graſs-ſeeds, they would not fail immediately to produce full crops of the beſt graſs.

But it was impracticable to reform the old method

method with reſpect to the ſowing graſs, however wrong, till means were provided for obtaining the proper kinds of ſeeds ſeparately, in order that they might be uſed in the place of the mixt ſeed. This could only be done, at firſt, by gathering with the hand: and, conſidering the ſcarcity of ſome kinds, neceſſarily required great trouble or expence. This matter was, therefore, never likely to be performed by private individuals, in a way effectual to the ſervice of the public: and the Society on that account took it upon them.

They purſued their intention of rectifying this ill management in the uſe of graſs ſeeds, in two views. The one, by an attempt to procure perfect ſeed, with the mixture of kinds, as they are found in the fields cultivated in the common manner. The other, to try to procure the ſeparate collection of the ſeed of each of the beſt kinds of graſs, in order to their being cultivated ſeparately, or in deſigned mixtures.

To proſecute the firſt of theſe views, they offered, in the year 1763, *to the perſon who ſhould grow, and produce to the Society, the greateſt quantity of the cleaneſt hay ſeeds, threſhed from hay, that has ſtood till ripe, (not leſs than ten ſacks) twenty pounds: and for the next greateſt quantity, not leſs than five ſacks, ten pounds.* This was never claimed.

The other view, reſpecting an object of a more novel and complex nature, they purſued by means of a ſucceſſion of different premiums. In their firſt advertiſement, they declared, that there were eight or ten ſpecies of Engliſh graſſes greatly preferable to all others; and offered, as premiums, the ſum of five pounds to the perſon, who ſhould produce the greateſt quantity, not leſs than ten pounds weight of ſeed, of each ſpecies, gathered

by the hand and kept ſeparate. The Society declared, alſo, in theſe advertiſements, that they *did not think proper to ſpecify the names of the graſſes they required: as ſuch graſſes have various names in different parts of the kingdom:* but they reſerved the right of excluding all ſuch as ſhould not be really *valuable and uſeful.*

It was certainly a right meaſure, to avoid, at that time, mentioning the particular ſpecies of the graſſes in the advertiſements; but to leave thoſe, who collected them, to conſult farmers, or other perſons of experience, or knowledge; if they themſelves had not ſufficient intelligence in theſe matters. For, by this means, the Society had an opportunity of knowing the ſentiments of the people, who ſhould become claimants, with reſpect to the reputation and value of the ſeveral kinds of the graſſes: at the ſame time, they avoided the difficulty and confuſion, which would then have happened from the introducing new names.

It may be proper to obſerve here, that the words *Engliſh graſſes* were uſed in the Society's advertiſements, to prevent the miſtakes that might happen, had the word *graſs* alone been uſed, from the people's imagining, that the plants called foreign graſſes, ſuch as the clovers, ſaintfoin, or lucern, &c. were included, if not ſolely meant: though theſe, being before collected ſeparately, and ſown alone, or mixt according to ſome intention, could not come within the deſign of the premiums. Theſe plants, called foreign graſſes, are not, in fact, of the graſs genus; but are called graſſes only from their being applied to the ſame uſes. There is, indeed, one ſpecies of the true graſs, that was before collected, and ſown with the foreign graſſes, which is the kind called

rye-

rye-graſs, or by ſome ray-graſs: but the Society took care to except it ſpecially in their advertiſements. The known utility of theſe foreign graſſes, and of rye-graſs in forming paſtures, by being ſown ſeparately, or in adapted mixtures, carries a ſtrong ſuggeſtion of the expedience of doing the ſame with all good Engliſh or true graſſes, when the ſeed can be eaſily obtained ſeparately: ſince the ſame advantages would attend the practice of this method with reſpect to them, when their nature and properties were once ſo well known, that they could be accommodated to each purpoſe.

In conſequence of the offer of theſe premiums, claims were made for ſeveral of the ſeeds of the beſt kinds of graſſes, which could be moſt eaſily collected: and an attention was excited in many, who were fond of improvements in agriculture, to this promiſing means of the improvement of paſturage. But it appearing now, on a more minute and better grounded obſervation, which theſe claims occaſioned, that one or two of the other kinds of graſſes were not to be collected without great trouble, in ſuch quantities as the Society required, from the plants accidentally found, an alteration was made in the advertiſement of the year 1765. In the conditions of the premium then propoſed, the limitation of the leaſt quantity of ſeeds of each kind to be collected, was reduced from ten pounds weight to one pound: and the ſum of five pounds was continued as the premium. The Society alſo ſpecified now the kinds of graſſes, of which the ſeeds were to be admitted to the claim: and they were; *the vernal—fine bent—meadow fox-tail—ſheeps feſcue—creſted dogs-tail*—and *common poa.* In order that theſe names might be underſtood by the candidates, the Society, in the advertiſement,

referred them to ſpecimens of the graſs in ſeed, to be ſeen at their Office, and to the prints of them in Mr. *Stillingfleet*'s *Miſcellaneous Tracts*; and in Mr. *Mills*'s *Huſbandry*.

A gold medal was alſo offered to any nobleman, or gentleman, who ſhould cauſe to be collected by hand, the greateſt quantity, not leſs than two pounds weight, of the *meadow feſcue*, *yellow oat*, and *annual poa*, in the year 1765: and ſhould ſow in drills, the greateſt quantity of land, not leſs than one acre, in the year 1767, with any of the kinds.

In the year 1766, the Society again changed their advertiſement, and offered, *for the greateſt quantities, reſpectively, of each of the abovementioned kinds of graſs ſeed, gathered clean from the fields, by hand, when ripe, in the year* 1766, *or produced, and clean ſaved, from ſuch ſeeds, gathered in the year* 1765, *as ſhall be ſeparately ſown in drills, and kept clean from all mixtures of other graſſes or weeds, ten pounds.* And preſuming rightly, as the event has ſince proved, that the laſt mentioned premium would procure the collection of ſuch a ſufficient quantity of moſt of the enumerated graſſes, as would enable ſome perſons to cultivate them ſo as to produce large quantities of the ſeeds, they ſuperadded ſome other premiums for the year 1767: conſidering the whole as a concluſive or final ſet, that would complete the whole of the Society's views. Theſe premiums were twenty pounds for the greateſt quantity of land, not leſs than one acre, ſown in drills, with each of the abovementioned kinds of graſs ſeed, unmixt with any other kind, in the year 1767.

By the event of theſe premiums, which have been claimed for two acres of one of the kinds,

and

and one acre for ſix other kinds of the graſs ſeeds, there is now a ſufficient ſtock produced for the uſe of the public: nor is there wanting an equivalent number of the promoters of huſbandry, who are ready to employ it for various purpoſes, and trials. The Society have therefore now diſcontinued their premiums for graſs ſeed: except the offering one for the ſowing the greateſt quantity of land, this year, with the *vernal graſs* ſeed; for the ſowing which, in 1767, no claim was made. And this may be conſidered as the completion of their very laudable undertaking, carried on by the moſt judicious means, and at a very liberal expence, as well to procure the ſeparate collection of the ſeveral kinds of the graſs ſeeds, as to diffuſe a general notion of the utility of them. In conſequence of their proceedings, there is now furniſhed the means of reforming the crude and diſadvantageous practice of ſowing the promiſcuous ſeeds of the hay-loft; as well as of making experiments in large, of the comparative value or fitneſs for particular purpoſes, of the ſeveral kinds of graſſes, or their commixtures with each other; and of diſtinguiſhing the ſoil to which each may be moſt ſuitable, or aſcertaining the moſt profitable management and application of them. The conſequences of this purſuit muſt neceſſarily be attended with very conſiderable improvements in paſturage: which, as has been above obſerved, is at preſent a concern of the greateſt moment to the welfare of Great-Britain. Whoever, deſiring to proſecute this matter, may wiſh to be more minutely informed reſpecting it, may conſult the laſt edition of the ingenious Mr. *Stillingfleet's Tracts*; or an excellent letter on this ſubject, ſigned *Philo-gramen*, publiſhed in the *Mu-*

ſeum Ruſticum, vol. V. by a gentleman who has been the principal inſtrument in the Society's undertaking and compleating this important affair. It may be proper to mention that the ſeveral graſs ſeeds, raiſed ſeparately, in drills, on the acres, for which the laſt premiums were given, are now in a fine condition; and will conſequently produce ſuch a quantity of ſeed as may ſupply numbers of gentlemen, who are deſirous to puſh this noble inquiry to its full extent.

The next purſuit in which the Society engaged for the promoting agriculture, was the endeavouring to procure the information and trials requiſite to the deciding the important queſtion, reſpecting the comparative utility and advantages of the DRILL, and BROAD-CAST *huſbandry*.

The former, and, indeed, yet almoſt general method of cultivating corn, turneps, pulſe, clover, the foreign graſſes, and moſt other field plants, that are not tranſplanted, is by ſowing them with the hand at large: in which method, they are ſpread over the whole ſurface of the ground; and, thence, ſaid to be ſown in BROAD-CAST. This is the moſt ſimple method; and requiring the ground, in general, only to be ploughed once or twice, and harrowed at the proper ſeaſon, occaſions the leaſt original expence in the preparation. But, in this method, manure and fallowing, or both, are neceſſary at ſhort periods: and a number of ſucceſſive crops of wheat, or other of the moſt profitable articles, are not to be had from it.

The *drill huſbandry* has, hitherto, prevailed but lately and partially. It conſiſts, in breaking the ground, by repeated ploughing, and harrowings, till it be fine: and then ſowing the ſeed in drills, or rows, with ſuch intervals betwixt each, as will admit

admit of the ground's being cut and ſtirred with a hoeing plough, drawn by a horſe. In this method, it is, alſo, practiſed to ſow the corn, or other ſeed, by means of a compound machine, called, from this uſe, a *drill plough*: which makes ſeveral ſeed furrows, depoſits the ſeed, and covers it properly with earth, all at one operation. It is not, however, till very lately, that any complete machine of this kind has been invented: and, therefore, the Society offered, for ſeveral years, a premium of fifty pounds for the producing one, that was ſo well conſtructed as to anſwer the end. They have two, for which premiums were given, in their repoſitory of machines ſubſervient to agriculture. But there are one or two others, of a more improved conſtruction, that will, alſo, ſoon be in their poſſeſſion; and are more ſimple, cheap, and effectual for the purpoſe. An accurate deſcription of the uſe and merits of theſe ploughs will be below inſerted among the following Memoirs.

It is not pertinent to the ſubject here, to enter into the diſpute, where and by whom the method of drill culture was firſt invented: but it is an unqueſtionable truth, that Mr. Tull, who wrote largely on this kind of huſbandry, was the firſt who introduced the uſe of it into our country. He, nevertheleſs, only ſtarted the notion. The practice was very little purſued till the Society awakened the public attention to it by their premiums.

The principle, on which the advantage of the drill culture is founded, lyes in the breaking the ſoil into fine parts, and expoſing it to the air in this ſtate: which becomes practicable, by means of proper machines of the plough or other kinds, when all the plants grow in rows, and at ſufficient

cient diſtances. In Mr. Tull's method, this was done by alternate fallow and crop in the ſpaces or intervals. But more advantageous methods have been ſince practiſed. This breaking the ſoil, and expoſing it to the operation of the air, is found to fertilize it: and Mr. Tull ſeeing the fact to be ſo, adopted a miſtaken theory, that fertilization conſiſted principally or ſolely in breaking the earth into fine parts, in order they might be the better fitted to enter the nutrient veſſels of the plants. It would be eaſy to ſhow, nevertheleſs, that reducing the earth into ſmall parts is only one means of fertilization, among many others; and not even a conſtant one in every circumſtance: that the fitting earth to enter plants by mechanical action, is entirely an error; as it never does enter plants at all in a ſolid and undiſſolved ſtate: and that when earth is in the moſt pulverized and incohering ſtate, it is leaſt fertile or capable of ſupporting plants. The fact is, however, certain, though for different reaſons, that ſtiff and cohering earth, broken and expoſed to the air, does gain a conſiderable degree of fertility; and is capable of yielding copious crops of ſome kinds of vegetables, it would not otherwiſe bear. It was natural enough for Mr. Tull, who was not much acquainted with the principles of chemiſtry, or the facts of natural hiſtory, to fall into this erroneous notion: and it ſhould not take off from his merit, of having made a noble effort to the improvement of huſbandry; the effects of which, when this method has undergone due improvements, will prove of the greateſt benefit to our country; and indeed to mankind in general.

The manner of practice of this kind of huſbandry, as taught by Mr. Tull, was in ſeveral par-

particulars erroneous, as might well be expected in a firſt eſſay, or, as was the caſe in moſt points, from untried notions: and, to the adhering too cloſely to it, is owing, in a great degree, the ſlow introduction, and the doubt of the general utility of the method itſelf. The intervals betwixt the rows of the plants, as recommended by Mr. Tull, were too great, perhaps double what they ſhould be in the moſt profitable method of culture: by which means much leſs crops are obtained than might be produced at nearly the ſame expence. This has rendered the profits of the drill method much leſs than they would have been in on a more judicious practice: and, conſequently, been a great diſadvantage to it, in the compariſon with the broad-caſt. Mr. Tull was led into this, partly from the want of more perfect inſtruments for hoeing: thoſe of which the conſtruction was then invented, being clumſy, and difficult to manage. The ploughs for drilling were more imperfect ſtill than them: and this defect of inſtruments has been another principal cauſe of the ſlow progreſs of thisimprove ment.

The practical advantages propoſed from the drill method of culture are the following: The ſaving the loſs of land, incurred by laying it fallow at ſhort periods; or the expence of frequent and large manuring; which are neceſſary in the broad-caſt: the deſtroying weeds, by the opportunity afforded of hoeing the intervals, either by the hand or horſes: the increaſing the fertility of the ſoil, by thus ſtirring and breaking the ground, ſo that each crop may be greater than in the broad-caſt way: the being able to earth the plants, or, in other words, to throw up the ſoil on the crown of the

the root, by which ſome kinds are rendered more vigorous, and preſerved from the effect of the injury of froſts: and the giving air to ſome ſpecies of plants, which will bear only towards the tops, where they are crouded, as in the broad-caſt manner of culture. Theſe are the benefits ſuppoſed to ariſe to the farmer, by this way of culture. Thoſe which the public would receive from the general practice of it, would be very great: as it ſubſtitutes labour in the place of fallow and manure; by which a conſiderable addition would be made to the national ſtock of proviſions procured. If manure were thus ſpared from the land on which corn, turneps, &c. were raiſed, it might then be employed on the poorer graſs lands: by which means, the crops in the inferior kinds of paſture would be much increaſed; and the whole produce of hay and graſs neceſſarily augmented. The proportion of labour in huſbandry, alſo, being thus increaſed, more hands would be occupied in it: whence population would be advanced in the moſt beneficial manner to the public intereſt. For the ſtock of proviſions being augmented, on the whole, in a much greater proportion, by this change of culture, than the number of people, the conſumption ariſing from the increaſe of number would not raiſe the price of them. Whereas, in our preſent ſtate, the multiplying the number of people employed in manufactures would tend to make proviſions dearer in a great proportion: and thus, rendering the general price of labour higher, would prove a *felo de ſe*, by giving foreigners an opportunity to underwork, and conſequently, underſell us at the markets of our exports: as we have already experienced in the loſs of ſeveral of the moſt capital articles of our commerce. Our danger in this point

point is, moreover, every day growing more formidable: as there is ſcarcely any ſtate in Europe, where both the government and people are not aſſiduouſly zealous in eſtabliſhing and improving manufactures.

It has been, nevertheleſs, diſputed, even to the preſent, whether the drill or broad-caſt culture be the moſt beneficial in general to the undertaker: or, rather, whether the firſt be not attended with actual loſs. It is certain, that an extraordinary expence is incurred in the preparation of the land for the drill culture; and more labour is required in the ſubſequent operations. But accounts of experiments have been laid before the public, to ſhew, that this original coſt is largely repaid by the ſaving afterwards made in a number of ſucceſſive copious crops, obtained without any fallow, or manure. Theſe ſucceſſive crops, even of wheat, have been ſaid to amount even to fifteen or ſixteen. On the contrary, the reſult of other experiments is related, and calculations formed on them, to demonſtrate, that the prime and other expences of this method are not repaid: the crops failing in two or three years; ſo as not to be worth the tillage after that time. Still other experiments, of which accurate reports have been given, furniſh facts, that vary from either of theſe extremes; and make the ballance turn on much nicer grounds of calculation of the comparative advantages of the two methods. The veracity of the gentlemen, who have given theſe accounts, though ſo different, can ſcarcely be doubted: and the wide variations muſt be aſcribed to different fitneſs of ſoil for this culture, or the plants raiſed by it; different management in the practice of it; and the different effects of favourable or impropi-

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tious ſeaſons, or other accidents. There is not, however, hitherto ſo great a ſcope of obſervations made on well conducted and extenſive trials, as to give room for a poſitive concluſion on many of the points relating to this culture: but there is great reaſon to conclude, on the whole, that it will be found profitable in moſt caſes where its advocates have recommended it: eſpecially ſince the later improvements of the machines or ploughs to be uſed in it; and of the methods of practice in other points, particularly with reſpect to the ſpaces of the intervals.

When the Society firſt took this matter up, the public had very little ground of known experiments and calculations, on which to form a judgement, how far it was worthy the notice of thoſe, who are ready to adopt feaſible improvements in huſbandry. It was, therefore, an object very fit, and very deſerving the regard of the Society, to promote ſuch trials, and examinations, as might afford juſt lights for a deciſion of this important point. They have already procured ſome ſuch lights, in former years: and they have lately obtained accounts of experiments, which will be found below in theſe Memoirs. But, as an extenſive baſis of facts and obſervations is required for the foundation of a concluſive determination, eſpecially with thoſe limitations and conditions which muſt attend every queſtion of this kind, they have with great propriety continued the premiums: and will, it is hoped, from year to year, gain farther accounts, that will be more and more ſatisfactory to themſelves, and the public. In publiſhing theſe accounts, they do not mean to give a ſanction to every opinion, or obſervation, contained in them, on their own authority: but only to

tranſmit to the world, the notions and facts laid before them by the candidates, or other correſpondents. They may, nevertheleſs, by the information and evidence thus obtained, and the diſcuſſion of an intelligent committee, be enabled, perhaps hereafter, to come to ſome final reſolutions on this intereſting matter; which may have a conſiderable influence in overcoming the tenacious adherence to the old method. In the mean time, the world will have the benefit of the particular communications from thoſe who gain the premiums; which cannot fail to convey very valuable inſtructions, or uſeful cautions.

Another very material improvement of agriculture was attempted by the Society, in their endeavours to facilitate the methods of DRAINING LAND: in which they have had all the ſucceſs they could deſire. The greateſt defect in the means of making ſuperficial drains was, the want of ſome machine, of the nature of a plough, which would cut a trench ſufficiently broad and deep, and lay the earth and the turf on the ground on each ſide, ſo as not to be ſubject to fall again into the trench.

The Society, in order to remove the impediment to the making buſh drains, or trenches in ploughed fields, in a cheap manner; the digging of which was a very conſiderable expence; offered, in the year 1764, a premium of fifty guineas, for the beſt plough, or machine, that would cut a trench one foot in perpendicular depth, and one foot eight inches in breadth at the top, and ten inches at the bottom. This premium was adjudged, the year following, to Mr. Cuthbert Clark, after trial of a plough of this kind produced by him. But the premium was again offered for the next year, when Mr. Clark again produced a plough, of ſimilar con-

conſtruction, but ſaid to be improved. The premium was, however, adjudged, on the trial, to Mr. Knowles, of the Iſle of Wight, whoſe plough cut a trench of one foot one inch in depth, and twenty inches in breadth at the top, and ten at the bottom; laying the earth, and turf, on each ſide of the trench, in the moſt exact and convenient manner. This was performed by eight horſes, before the Committee, with great eaſe and diſpatch. It has been obſerved, however, on further conſideration and trial, that if this plough was made two, three, or four inches narrower in the part which cuts the bottom of the trench, it would require much leſs force; and yet anſwer the purpoſe equally well.

The uſe of this plough, for draining ſpringy, poachy, or moraſs lands, cannot fail to be of conſiderable emolument to the public. The waſte of wet lands, either by a total neglect of them, or by the occupation of them in a bad condition, is an exceeding great loſs to the community: as many of theſe lands would prove extremely fertile when drained. The principal reaſon of this neglect, and loſs, is, that the proprietors of ſuch lands, though ſenſible of the ultimate advantage of it, are deterred, in general, from making drains, by the greatneſs of the expence: which, when there was no other means but digging the trenches, was, indeed, very conſiderable. Whatever, therefore, may in any material degree leſſen that expence, muſt of neceſſity tend to remove this difficulty: and of courſe occaſion a greater number to undertake this uſeful work. The coſt of making buſh drains is greatly reduced by the invention of ſuch a plough for this purpoſe, as the Society has now procured: and where *buſh* is not dear, they may

may be compleated at an eaſy rate. The uſe of ſuch a plough for open trenches in arable lands is, likewiſe, of very great conſequence: as it will, in this way, be attended with very ſmall expence, compared to the methods formerly practiſed.

There is a further very momentous advantage ariſes from the draining lands: which is the rendering the country more healthy. For nothing contributes more to the unwholeſomeneſs of any place, than the vapours exhaled from marſhy or boggy ground.

The Society have, therefore, done the public a very eſſential ſervice, in obtaining for its uſe the invention and knowledge of ſo perfect a machine, wanted for ſuch valuable purpoſes. The good effects indeed already appear. For above twenty of theſe ploughs have been made, in conſequence of orders, by one perſon only in London: which evinces the ſenſe that is entertained of their utility. In order, nevertheleſs, to bring this machine into more frequent uſe, it were to be wiſhed, that the general expence of buſh-draining, with the aid of ſuch a plough, was to be aſcertained, as to each particular article; and made known to the world. It would, we muſt allow, vary in different places, as the price of buſh, labour, &c. are different in them. But, if a clear ſtate of the particulars were given, as to any one place, it would be eaſy to change the rates of them; and accommodate the computation to the circumſtances of any other. There is reaſon to believe, from good authority, and facts, that the expence of drains, when made thus, will be found much leſs than is commonly imagined: and that it is in the power of many, who are not apprized of its coming within the reach of their abilities, to gain great advantages by ſuch

an improvement of their land. The general knowledge of this would, therefore, encourage many to go about this important buſineſs, who are hindered from thinking of it, by the imagination of its being a matter of great expence; ſuch as their circumſtances would not bear.

The MACHINE FOR SLICING TURNEPS, was, alſo, an improvement, relative to agriculture, procured by the Society to the public. It is not of equal importance with ſome of the abovementioned objects: though it is, nevertheleſs, not without utility. The cultivation of turneps for feeding neat cattle has been a means of preventing the price of beef, and conſequently of other fleſh, from riſing to a ſtill much greater price than it has done: which muſt, had it happened, have occaſioned the deepeſt diſtreſs. The ſcarcity of hay, after a bad ſeaſon, in winters where there are long froſts, is the occaſion of deſtroying the ſtock of cattle and ſheep; and, conſequently, of the riſe of their price. The uſe of turneps, being a great ſaving to fodder, leſſens the want of it; and is a very material check to thoſe miſchiefs, which reſult from ſuch want. The employment of land, that would otherwiſe be waſte fallow, for the cultivation of turneps, is, alſo, another conſequence of their uſe, that 'conduces to national good': as it increaſes the ſtock of proviſions raiſed; and, moreover, makes ſome ſavings of expence in the culture of corn, by leſſening the charge of rent that lyes on the whole rotation of crops and fallow.

Theſe advantages have gradually introduced the uſe of turneps: but not ſo generally as it were to be wiſhed. For it has been a diſcouragement to thoſe who could not well bear ſuch a loſs, that cattle have been frequently choaked with them:

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particularly in the places where they are apt to be ſmall; as is the caſe in ſtiff clayey grounds. Many inſtances could be given of perſons, in different parts, who have ſuffered materially by this accident: which, though it may not much affect graziers who deal largely, may fall heavy on little farmers, to whom the value of a fat beaſt or two may make a great difference in their affairs. This led to the expedient of ſlicing the turneps by the hand, in many places, among thoſe who had a moderate ſtock of cattle: for it is hardly practicable, in that way, by thoſe who have very great herds. Mr. Wynne Baker, particularly, in his report to the Dublin Society for the year 1765, complains of his having ſuffered much by his cattle being thus choaked: and mentions, that he employed every night, on that account, thirteen of his people for two hours after they came from work, to ſlice turneps for this purpoſe. But there is another benefit, alſo, that ariſes from this practice: which is, that both cattle and ſheep, having a diſlike to the rind of turneps, ſcope them; and, rejecting the outſide part, make a great waſte by that means. This loſs is intirely avoided by the ſlicing the turneps: as the beaſts then eat the whole without making the leaſt waſte. It has been ſaid, nevertheleſs, by ſome, that the practice of ſlicing turneps is of no utility, nor anſwers any material purpoſe: as the danger of the cattle's being choaked by turneps is but ſmall. To this it may be replied, that it is beſt, any danger at all of that kind ſhould be avoided, if it can be ſo without bringing on a greater inconvenience: and, therefore, the proper queſtion will be, whether the expence of ſlicing is not too great a rate of inſurance againſt this miſchief. Experience has determined

mined, to thoſe, who have adopted this practice in England, that it is not ſo, even when done with the hand: and there are many, who have practiſed it, that uſe conſiderable quantities of turneps; and who live where moſt are uſed; and where, conſequently, they have the beſt opportunity of forming a judgment on the expedience of it. But it prevails as a general cuſtom in ſome other parts of Europe, where turneps have been applied to the feeding cattle much longer than with us: particularly in Carinthia, a province in the Auſtrian dominions, where great numbers of cattle are fed with this root. A great inconvenience, however, attended the ſlicing turneps in the way, ſolely practiſed before the invention of this machine: which was, to hold them in one hand, and ſtrike with a knife by the other: whence, from the leaſt inattention, the perſons ſo employed were extremely ſubject to wound themſelves: particularly on the joint of the thumb; where the hurts in general produce very injurious conſequences.

Under theſe circumſtances, without deciding whether the ſlicing turneps were really an uſeful practice or not, a machine for ſaving the labour of ſo many people; preventing their maiming themſelves; removing the diſcouragement to the culture of this root, where ſlicing by the hand was not convenient; and avoiding the waſte of the turneps, by the cattle's ſcooping them; could not fail to be of advantage to thoſe who before did actually practiſe it. For whether it be judicious or erroneous in them to follow this practice, it is better, ſince it is done, they ſhould do it without the expence and danger, which attended the former method.

The Society, therefore, thought the matter worthy

worthy ſome notice, eſpecially as there was a probability of ſucceſs, without the being at any conſiderable expence: and accordingly they offered a premium of twenty pounds to the perſon, who ſhould produce the beſt machine fit for this purpoſe. There were ſeveral candidates, who ſent machines: among which were one or two, that would have anſwered the end moderately well. But one, to which the premium was adjudged, exceeded the reſt beyond all compariſon; and performed what was required, even beyond all expectation. It was invented by *Mr. James Edgell*, of *Frome in Somerſetſhire:* and whatever doubt the final utility of ſuch a machine may admit, the perfection of this, as to the execution of what is intended, cannot poſſibly bear any. It may be eaſily ſet at will, by proper ſcrews, to cut ſlices of any thickneſs that may be deſired: and, the turneps being put into it, a man or boy can diſpatch an almoſt incredible quantity. The particular conſtruction, and manner of uſe of it, will be explained below, in the account and deſcription of the Society's machines. I ſhall, therefore, only obſerve further here, that the quick ſucceſs of the Society in obtaining this machine, is a ſtriking inſtance of the effect of their premiums. For it does not appear, that ſuch a machine had ever been thought of before; and yet, in the firſt year the matter was ſtarted, by the incitement, and information of their advertiſements, one was procured, which perfectly anſwers the purpoſe. It is, indeed, of the moſt meritorious conſtruction, whether we regard the ingenuity of the contrivance; or the complete performance of the office.

The Society have, likewiſe, done a conſiderable good to the future, as well as preſent intereſt

of agriculture, by the collection of various other improved machines ſubſervient to it; which they have made for the benefit of the public. In this collection, they have not confined themſelves to machines, of which they occaſioned the invention by their premiums, or which were brought before them for their approbation or reward; but they have purchaſed, or otherwiſe procured ſeveral others.

Amongſt theſe machines, there is a fine model of a THRESHING MILL: which may be affixt to a common wind-mill or water-mill, and wrought by the ſame power as moves ſuch mills; or by any other power of water, wind, or horſes, ſolely applied to itſelf. This machine was invented by Mr. *Evers*, of *Swillington* in *Yorkſhire*, ſince dead: who erected one at large: which continues to work. The operation of threſhing is performed, in this mill, by means of a moving circular floor, on which the ſheaves of corn are laid; and carried ſucceſſively under a croſs row of a kind of flails, placed perpendicularly; which fall on them as they paſs under; and thus threſh out the corn with their ends. The ſtrokes of theſe flails are ſo controlled by ſprings, that they are prevented from bruiſing the corn more than would happen from the moſt expert uſe of the hand-flail. There are undoubtedly particular ſituations where ſuch a machine may be found of conſiderable utility in our own country. But in our American colonies it certainly would, in many caſes, be of the utmoſt advantage, when joined to a mill for grinding corn.

The Society have another excellent MACHINE, of more general uſe, invented by the ſame Mr. *Evers*, for WINNOWING CORN. This performs its office, in the moſt perfect manner, with the greateſt

eaſe and diſpatch; freeing at once the corn from the chaff and duſt; and ſeparating the light from the ſound part of the corn. It requires very little room, or force to work it.

There is, alſo, another very good MACHINE for DRESSING WHEAT: for which the inventor received, from the Society, a bounty of fifty pounds.

This collection of machines contains, likewiſe, a number of excellent ploughs, and models of PLOUGHS, for various purpoſes, as *trenching*; *turning*; *hoeing*; *cutting*, or *ſcarifying graſs land*, *&c.* An excellent *chaff-cutter*, or *machine for cutting ſtraw* is, alſo, lately diſcovered: of which a deſcription will be hereafter given in this work.

Theſe machines, by being ſubjected to the inſpection of numbers in the Society's repoſitory, have undergone ſtill further improvements: and have ſerved as models for the making many of ſeveral of the kinds, which have been carried into different parts of the country; where the uſe of them has been by this means introduced. I ſhall not enumerate them here: as a catalogue will, in the courſe of this work, be given of the whole of the Society's collection of machines, with explanations of the uſe, and deſcriptions of ſuch as require it, in order to their becoming more uſeful to the public.

The Society have, alſo, attempted, in other inſtances, the encouragement of agriculture by their premiums: ſome of which, being yet continued in their preſent liſt, we ſhall have a more proper occaſion to conſider them below, when we explain, as is intended, the advertiſements for premiums now offered.

On the whole, the advantages the public have, and will receive from what the Society have already done for promoting agriculture, muſt be allowed

be very great: and there are other matters, relating to it, now under their conſideration and encouragement: which, when they are carried into execution or compleated, will, it may be poſſibly preſumed, prove of equal conſequence.

SECT. IV.

Of Improvements in the Mechanical Arts.

THE Society's attempts to promote the MECHANICAL ARTS, whether for the improvement of particular manufactures, or of machines for general purpoſes, have not been conducted with leſs ſpirit, application, and liberal expence than thoſe to advance agriculture. Their ſucceſs in theſe attempts may be, alſo, deemed equal to thoſe exerted in the cauſe of agriculture: though, as they relate to ſubjects leſs commonly underſtood, or attended to, they have not been equally known or regarded by the public. It is, however, undoubtedly true, that the Society's endeavours have produced, in ſome inſtances, and brought to light, or introduced into uſe in others, the invention or improvement of ſeveral capital machines; as well as others of leſs importance: and excited, alſo, ſuch a diſpoſition to the ſtudy of practical mechanics, in numbers of ingenious perſons, as will hereafter be productive of many beneficial conſequences to the public.

The improvement of the machines ſubſervient to agriculture, though properly belonging to mechanical arts, in a general view, having been already conſidered under the head of Agriculture, will be of courſe omitted here. That of the others,

others, whether relative to particular manufactures, or general purpoſes, will be inveſtigated nearly according to the order of time in which the Society took them up.

One of the firſt and greateſt articles of manufacture, which the Society embraced as an object of encouragement, was, the making CARPETS in imitation of thoſe brought from the Eaſt, and called Turky carpets.

The importance of this object ariſes from various principles. The importation of foreign carpets, at the time the Society firſt offered this premium, might be eſteemed conſiderable: but the uſe of carpets, from the increaſing luxury of the age, is exceedingly more general at this time than it was then: and the national expence of the whole, were they now had from abroad, would, conſequently, amount to a very large ſum. A great part of this expence is ſaved at preſent, by our own manufacture of carpets; which is particularly valuable to us, likewiſe, from another circumſtance. This is, that carding and ſpinning make a great part of the work: which, conſequently, employ women and children; who are thus rendered profitable to the public, and moral in their conduct, inſtead of being burthenſome, or looſe in their way of life; as they otherwiſe would be.

It has been alledged, that the preventing the importation of Turky carpets, by domeſtic manufactures, in which there is a conſumption of our own wool, was rather a detriment than an advantage to the public: becauſe the price paid for them, at firſt hand, exceeded very little, if at all, the value of the wool here: and that the bringing in Turky carpets, therefore, was, in fact, the ſame as the importation of ſo much wool into this

this country: our own being, by that means, correſpondently ſaved to be uſed in other manufactures, where the greater proportion of labour yielded a much greater return. This argument would, perhaps, have great weight, if the uſe of carpets was as limited now as formerly; and the wool employed in making them, was fine, and proper for more valuable manufactures. But, the much more general uſe of carpets, if our own manufactures had not ſupplied the greateſt part, would have highly raiſed the price of them: in which caſe, we ſhould have paid conſiderably to foreigners for the labour: and the coarſe and refuſe wool, that could not find an adequate application to other purpoſes, being the kind moſtly employed for this, is thus conſumed and rendered profitable. Domeſtic manufacture of carpets, therefore, tends, inſtead of depriving the other manufactures of their wool, to the encouragement of the production of it, in general, by affording a vent to this kind.

The weaving of carpets has, moreover, a great affinity with that of tapeſtry; or, in fact, they are only different branches of the ſame manufacture. The improvement of one, conſequently, carries with it that of the other: and we, accordingly, have ſeen, that along with the eſtabliſhment of carpet weaving, in our own country, tapeſtry weaving was introduced, and carried to a very high degree of perfection, in more than one manufactory. This makes a national ſaving, of which the far greateſt part of the expence lies on the work; and prevents our ſending conſiderable ſums to France: which had poſſeſt itſelf of the more perfect practice of the art of tapeſtry weaving;

ing; and ſold part of the produce to us, at a very high price.

The Society were, therefore, very judicious in the choice of this, as one of their firſt objects in the encouragement of manufactures; and their ſucceſs has been correſpondent. For, in 1757, claims were made: and premiums, of twenty-five pounds each, adjudged to two candidates, for ſpecimens which gave great ſatisfaction. In 1758, one of the ſame candidates received another premium of twenty-five pounds; and another candidate the like; for ſtill greater improvements: and, in 1759, two other premiums were given; the firſt, of thirty pounds, to a candidate who had received thoſe of the preceding years: and the ſecond, of twenty pounds, to a new candidate. The Society, then, thought this article ſufficiently introduced: and diſcontinued their premiums. But application was made to them, in the ſucceeding years, for liberty to expoſe to public inſpection, in the great room of their meetings, ſome other fine ſpecimens of further improvements: in conſequence of which, the manufacturers obtained the notice of the public: and the means of great encouragement and demand for their works.

The Society may, from theſe premiſes, be juſtly deemed to have contributed, in a very high degree, to the introduction of thoſe extenſive and valuable manufactures of carpets, eſtabliſhed in various parts of Great Britain; as well as to that of tapeſtry; which now yield a very conſiderable national ſaving or profit.

The procuring *paper proper for printing with copper-plates*, to be manufactured in England, was another of the Society's firſt objects of the ſame kind. They were induced to turn their regard to this

this article, by finding, that a very conſiderable ſum was paid to foreigners, particularly the French, for this ſort of paper; which rendered it a matter of national importance.

The Society accordingly offered premiums on two conditions. The one for making a ſpecimen of ſuch paper proper for receiving impreſſions of the beſt copper-plates, as ſhould be neareſt in all its qualities to the French: of which ſpecimens were to be obtained at the Society's office. The other, for making ſuch paper equal in all its qualities to the French. The firſt of theſe has been three times gained. The firſt time in 1757. The ſecond and third times, by the ſame candidates, in 1763, and 1764. Other claims have been ſince made, but were not allowed. The premium for making this paper equal in all qualities to the French has never been yet obtained: though the Society's endeavours have procured the manufacture of an inferior kind, which anſwers for common purpoſes; and makes a national ſaving.

There is, indeed, an exceeding great obſtacle to the making perfectly good fine paper of any kind in England: and, more particularly, of the ſort proper for copper-plate printing. This is, a very faulty method, introduced almoſt generally into the manufacture of paper: which conſiſts in chopping the linnen rags, of which the paper is to be made, inſtead of beating them into pulp. In this improper manner of preparation, the fibres of the linnen are divided into ſhort parts: which deſtroys the ſtaple; renders the paper leſs tenacious; and makes the uſe of a greater proportion of gum neceſſary. This gum, moreover, cracking by the wear, divides the paper: or, being taken out by moiſture, the paper is then rendered exceeding weak;

weak; and ſubject to be torn with the leaſt force. This faulty mode of manufacture produces a ſtill greater inconvenience with reſpect to paper for printing with copper-plates than for any other kind. As there is an indiſpenſible occaſion to moiſten it to a conſiderable degree, in order to bring it to a due ſoftneſs for receiving the impreſſion: and the gum, on which the tenacity of the paper formed of cut rags principally depends, being, by this means diſſolved, the texture of the paper is proportionably injured. The laſt ſpecimen brought to the Society was an evident inſtance of this: as it loſt almoſt all its coheſion, by being wet in the due degree for printing; and would hardly bear in that ſtate to be laid on the preſs. It is probable, therefore, this improper treatment of the materials is the principal impediment to the effect of the Society's premiums, in producing paper of this ſort fully equal to the French; and will, if not avoided, be ſo to all improvements of the finer kinds of paper in England.

The ſpinning of Flax, Wool, and Cotton, was another moſt material article in this claſs, which the Society took early under their encouragement. It is unneceſſary to expatiate much on the importance of this work: as very evident reaſons demonſtrate it. Not only ſeveral of the moſt ſtaple manufactures of our country depend on it; but it is the moſt general employment of the female ſex; who are capable of managing one branch, or other of it, at almoſt every age: whence it muſt be allowed, nothing could be more beneficial to the public, either in a political or commercial view, than the ſupplying means to promote the more general application of idle hands to ſpinning. The

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Society, therefore, ſet about to attain this great end by various means.

They furniſhed incitements to induſtry in this work, by premiums for the greateſt quantity of linnen, woollen and cotton yarn, ſpun in one year in work houſes. They ſtrove to eſtabliſh this uſeful ſpecies of manufacture in them, becauſe there the poor are for the moſt part, to the public loſs, maintained by the public in idleneſs. They attempted to improve the practice of this art in England; and to introduce the ſpinning thoſe finer kinds of thread, or cotton yarn, which we are at preſent furniſhed with from foreign countries. But the moſt efficacious, and proper means, by which they eſſayed to encourage ſpinning, were the efforts to procure improvements in ſpinning-wheels, and the other inſtruments ſubſervient to ſpinning: ſuch as reels for winding, twiſting, &c. This was the method moſt conſiſtent with the principles of the inſtitution of the Society; as well as with the means of their influence: and it was accordingly attended with the moſt obvious ſucceſs.

The premiums for ſpinning fine, were claimed each ſucceſſive year, from 1759 to 1766 incluſive. At which time they were diſcontinued along with others, to make way for that variety which is neceſſary in the objects of the Society's premiums.

The premiums for ſpinning in workhouſes were claimed in the years 1759, 1760, 1761: when they were likewiſe diſcontinued.

The general effects of theſe premiums, with reſpect to the Society's views in them, are not eaſily to be diſtinguiſhed; nor does it ſeem that inciting ſome particular perſons to exert themſelves to gain premiums by their induſtry, or application to fine ſpinning, can have any very extenſive conſequences.

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On the other hand, the improvement of machines, or inſtruments, by which more work can be done with equal eaſe; or the ſame with more eaſe; will always, when made public, be an encouragement to the reſpective manufacturers who are to uſe them; and will, conſequently, ever engage greater numbers to undertake the work. And ſuch improvement of machines, or inſtruments, depending on the ſkill, ingenuity, or application of a few particulars, the Society's rewards may be, and indeed in almoſt every inſtance have been found, adequate incitements to thoſe, who are capable of performing the matters of this kind propoſed. The Society, being now well apprized of theſe principles, have, in general, diſcontinued thoſe premiums, where labour and induſtry only, without novelty, invention, or improvement, were in queſtion; and confined their views to thoſe matters, where invention, or the diffuſion of material information, make the object.

This is moſt particularly evident in the inſtance before us with regard to ſpinning: ſeveral very eſſential improvements having been made and brought into practice by the Society's endeavours.

The Society offered three kind of premiums, reſpecting the perfection of ſpinning-wheels, and the operations ſubſervient to ſpinning. The firſt was for the greateſt improvements in the common ſpinning-wheel: either for wool, cotton, flax, or ſilk. It was originally thirty pounds.

In 1761 the Society advanced this premium to forty pounds.

They again increaſed the ſame in 1762; and offered fifty pounds, as a firſt premium; and twenty-five pounds as a ſecond. Theſe premiums were

continued

continued to 1766: and then omitted, to make way for freſh objects of the Society's views.

In 1761, the premium was allowed to two candidates; and divided between them, in the proportion of twenty pounds, and ten pounds.

In 1762, thirty pounds, part of the firſt premium, was adjudged to one candidate, for an improvement in the longſhed ſpinning-wheel.

In 1764, fifty pounds, being the whole firſt premium, was adjudged to a candidate for an horizontal wheel for ſpinning with both hands.

In 1765, twenty pounds, part of the ſecond premium, was adjudged to a claimant for a vertical ſpinning-wheel for both hands.

In 1766, thirty pounds, part of the firſt, and fifteen pounds, part of the ſecond premium, were alſo given to other claimants, for improvements in the common ſpinning-wheel.

The horizontal wheel, to which fifty pounds was given, had great merit, as it performs perfectly well the office of ſpinning with both hands at the ſame time. It is now introduced into practice, particularly in the Foundling Hoſpital; and is found of great uſe. The advantage of ſpinning with ſo great diſpatch tends to the emolument of the public, not only by occaſioning more work to be done by the ſame number of hands, and extending the manufactures dependant on ſpinning, by lowering the price of the commodities produced by them, but by inciting numbers to apply themſelves to ſpinning, in conſequence of their being able to earn more money by their labour.

In the other premium reſpecting ſpinning-wheels, the Society carried their ſpeculation further than the improvement of the common kind. They offered a reward for the beſt invention of a machine

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that would ſpin ſix threads of flax, cotton, wool, or ſilk; and require only one perſon to work and attend it. This would have been a deſirable improvement, if it could have been attained in a manner fit for practice: but it ſeems attended with almoſt inſurmountable difficulties. A machine, by which one perſon may ſpin ſix threads at the ſame time, muſt be complex; and neceſſarily liable to be put out of order: whence alſo it muſt be expenſive in its original purchaſe, as well as repair. If the ſpinning be performed in ſuch a machine by the fingers, it will demand much habit, to gain the dexterity requiſite to ſo nice an operation; and alſo a very cloſe, and of courſe a very tireſome, application to the performance. If it ſpin of itſelf, and only require to be moved, as to the original power, or rectified when any parts fail, it will want, as appears from the moſt elaborate experiments, a peculiar mode of carding: which, by the expence of the cards, and the labour; together with that of the prime coſt and repair of the machine; renders this kind of ſpinning, on the whole, at leaſt equally expenſive, and much more difficult than the uſe of the common ſpinning-wheel; more eſpecially that of the two handed one above mentioned.

I am authoriſed to give this judgment on the principle of ſpinning by mechaniſm, inſtead of the hand, from my own obſervations, as well as thoſe of two other very judicious members of the Society, who were beſt acquainted with that matter, in the ſpinning machine invented by the late Mr. Paul: which carried this application of mechanics to the greateſt extent, it is perhaps capable of. By a very great expence, and the aſſiſtance of the moſt ingenious theoretic, as well as

practical mechanicians of our time, he attained to the conſtruction of a machine, that being moved by water, horſes, or any other power, would ſpin, in the moſt perfect manner, any number of threads, without other aſſiſtance of the hand, than to ſupply the carded cotton, take away the finiſhed roll of thread; and rectify any accidental diſorders of the operation. But the delicacy of the work of the machine, equal almoſt to that of clocks, which ſubjected it to be ſo eaſily diſordered, and at the ſame time ſo expenſive to be repaired; and the peculiar manner of carding, which was, likewiſe, very expenſive; have occaſioned this machine to be now wholly laid aſide as unprofitable, after ſixty or ſeventy thouſand pounds have been ſpent in various attempts to eſtabliſh its uſe.

The Society, however, offered in 1760, a premium of forty pounds for the beſt, and twenty for the next beſt conſtruction of a wheel or machine; that would ſpin ſix threads of wool, cotton, flax, or ſilk at the ſame time; and require only one perſon to work and attend it. In 1761, this premium was raiſed to fifty pounds for the beſt, and twenty-five pounds for the next beſt: and, in 1762, it was again augmented to one hundred pounds for the beſt, and fifty pounds for the next beſt.

In 1763, part of the ſecond premium, of twenty-five pounds, was given for a machine of this kind, or rather an attempt towards ſuch a machine: which was the only reward adjudged for this matter: and the ſame year the premiums offered on this ſcore, were wholly diſcontinued, for the reaſons above alledged.

The Society, alſo, in 1764, appointed a premium for the inventing the beſt portable machine for winding and doubling worſted, cotton, or linen yarn,

yarn, not leſs than twelve threads at one time. Theſe premiums were fifty pounds for the beſt; and twenty-five pounds for the next beſt. In 1765, they altered the expreſſion of their advertiſement; and offered the ſame premiums for inventing the beſt portable machine, for winding from the ſkain, and doubling worſted, thread, or cotton, not leſs than twelve ſingle threads, into three or four threads in each twiſt: and they reduced the quantity of the reward to twenty-five pounds. The year following the whole was diſcontinued.

In 1765, twenty pounds, part of theſe premiums, was adjudged to be equally divided between two claimants, for machines of this kind, that had ſome merit; but did not come up to the full perfection the Society conceived might be attained. In 1766, twelve pounds, part of the premium of twenty-five pounds, was, alſo, adjudged to another claimant, for ſuch a machine as was deſcribed in the advertiſement of 1765: which was deemed an improvement, but not to the firſt degree of perfection.

All theſe ſpinning-wheels, &c. are retained in the repoſitory of the Society's machines: where they may be ſeen, or models taken by manufacturers, on due application for leave to the Society.

The making DRUGGET in England, *fit for the Liſbon market*, was another of the early articles relating to manufactures, of which the Society took up the encouragement. The reaſon of their attention to this matter lay in theſe circumſtances. The French diſpoſe of a great quantity of drugget at Liſbon: and from the neglect of our not making the proper kind, we obtain no ſhare of this trade: though, as far as appears, we might rival the

French in it, if we were to purſue the proper means.

The Society, therefore, conſidering the extenſion of every branch of the woolen manufacture, as a material advantage, thought fit to offer a premium of twenty pounds for the making a piece of drugget, neareſt in quality and price, to a ſample of the French, exhibited to view in their office: and to the next in merit, ten pounds.

Claims were accordingly made; and, in 1759, the premiums of twenty, and ten pounds, were adjudged to two claimants, who produced ſatisfactory pieces: and, again, in 1760, and 1761, the firſt premiums of twenty pounds were allowed to other claims.

It now appearing, from theſe ſamples, that we were in poſſeſſion of the means of making this kind of drugget in conſiderable perfection, the Society changed the terms of their advertiſement; and offered thirty pounds as a firſt premium, twenty pounds as a ſecond, and ten pounds as a third, for aſſortments of druggets, of the ſame kinds as the ſamples to be ſeen at the Society's office, the cheapeſt and beſt in quality, from ſixteen pence to twenty-two pence per yard. The aſſortments to conſiſt of at leaſt three pieces.

In 1762, the firſt premium was given: and the whole was diſcontinued by the Society, on the preſumption, that the end was obtained, as far as their endeavours could conduce to it.

In conſequence of the pieces produced to the Society, ſeveral conſiderable orders were given by ſome merchants to the reſpective manufacturers. But it does not appear, that any material advance is ſince made in this article of trade.

The Society, nevertheleſs, gave the matter a fair

fair chance, by bringing the manufacture to due perfection: and it is owing to exterior circumſtances, attending the courſe of our trade with Portugal, that their views have not yet ſucceeded better. This is, however, to be leſs regretted, as it does not appear, that the eſtabliſhment of new branches of the woollen manufacture would be followed with a certain advantage: For, without the price of labour were kept down, by a proportionable augmentation of the number of hands; and that of wool, by an encreaſe of the quantity; ſuch new manufactures might only embarraſs thoſe we now poſſeſs; which are of the moſt ſtaple kind; and, perhaps, in that light do more miſchief than good.

The Society, alſo, entered more lately on another matter of a ſimilar nature to this. It was the introducing a manufacture of a light ſpungy fine *broad cloth*, for which there is a conſiderable demand at the *Liſbon*, and other markets, that ſupply cloth for the uſe of the ſouthern countries.

The Society's ſpeculation on this ſubject aroſe from their being urged to offer premiums for our vying with foreigners in their dyes of black and ſcarlet. The reaſons for this were, ſome erroneous notions, then pretty general, that the black and ſcarlet colours of cloth were much better dyed by foreigners than ourſelves. On canvaſſing this point, the fact itſelf was denied by thoſe, who were beſt acquainted with the matter: and they aſſerted, that we really had now the art of dying theſe colours in equal perfection with any other country; and did actually dye them as well. It was allowed, however, that foreign cloth had a better appearance as to colour; and even that this colour was more durable in the wear. But this was aſcribed to another principle; and not the ſuperiority of the

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dye. It was advanced, that the cloth made for the uſe of the ſouthern countries was of a different manufacture from ours; and, being much lighter, and of a more ſpungy texture, imbibed the dye throughout the whole ſubſtance: which both gave a greater force of the colour to the eye, and rendered it more laſting in the wear: ſince it penetrated the whole ſubſtance of the cloth; and could not be worn off as in our cloths, where it tinged only the ſubſtance. On the difference of opinion, with reſpect to this fact, the Society procured the moſt perfect ſpecimens of ſuch cloth, both dyed in France and Holland; which being examined and compared with ours, it appeared, that our dyes were equal, if not ſuperior, to the beſt of the others.

The Society, therefore, induced by the above-mentioned reaſons, which availed in the caſe of the drugget, thought fit to offer premiums for the manufacturing ſuch light ſpungy cloths: and in the year 1764, they publiſhed the following advertiſement.

"Whereas, notwithſtanding the manifeſt ſuperiority of the beſt Engliſh broad cloths, there is a kind of fine cloths in much demand at ſeveral foreign markets, and particularly thoſe of the ſouthern countries of Europe; eſpecially of the following colours, viz. ſcarlet, black, blue, green, and white; the chief recommendatory qualities of which cloths are fineneſs, lightneſs, and a ſpungineſs of texture, that ſerves effectually to imbibe the dyes; ſo ſmall a degree of preſſure, as will not injure the colours, or occaſion ſpots from rain; and a peculiar kind of liſt, which is eſſential in ſome uſes; the Society, from a deſire of contributing all means in their power

for

" for extending our moſt valuable commerce in " exported manufactures, do offer the following " premiums, on the conditions annexed.

" To the perſon, or perſons, being partners in " trade, who ſhall, on or before the firſt day of " December 1765, have made, and ſold the great- " eſt number of pieces, not leſs than thirty, of " ſuch cloths as are above deſcribed, and accor- " ding to the patterns delivered; each piece to be " as wide as the pattern, and of the uſual length " of broad cloth; one hundred pounds."

A ſecond premium of ſixty pounds was, likewiſe, offered for the next greateſt number, not leſs than twenty ſuch pieces: and a third of forty pounds for the third greateſt number, not leſs than ten. They required, alſo, a piece dyed either black, or ſcarlet, and properly preſſed, ſhould be produced to the Society for their inſpection: and they ſubjoined, moreover, this *nota bene*.

" N. B. Patterns of thoſe kinds of cloths, for " which theſe premiums are offered, are ready to " be delivered, by the regiſter of the Society, at " their office in the Strand. But as the nature " of markets may make an aſſortment of qualities " requiſite, the candidates are hereby informed, " that the Society allows of varying the qualities " of their cloths, for the ſake of aſſorting them, " provided the whole extent in the variations in " pieces, do not exceed the limits of two ſhillings " per yard. However, the pieces ſent in for in- " ſpection muſt be of the beſt quality."

This premium, nevertheleſs, was not obtained: but was again offered in 1765.

In 1766, a change was made in the quantum of the premium, and number of pieces of cloth. The premiums were then reduced to forty pounds for

the greateſt number; and twenty pounds for the next greateſt. And the limitation of the number was reduced to ten, and ſix pieces.

Claims were made for this premium, but never allowed. But that is no great matter of wonder: For though there was one ſtated object in view, intelligible enough to thoſe, who were well acquainted with the Liſbon trade, to which this premium principally had regard; yet it was too complex to be preciſely expreſt in the Society's advertiſements, either to the underſtanding of the manufacturers, or even of the body of the Society, who were to determine on the claims. This rendered the matter leſs proper for the concern of the Society: as every thing for which any premium is offered, ſhould be of ſuch nature as admits of clear and diſtinct conditions, that can be comprehended by the members in general. Beſides this, the ſame circumſtances, which were before mentioned with regard to the drugget, hold good here with reſpect to the dubious importance of the manufacture of this kind of cloth. For, unleſs we multiply the number of hands, or augment the quantity of wool, we ſhould only change the mode of the woolen trade; and not really add to it by the introduction of new branches. And as this premium was to operate, by the encouraging the art of making ſlighter and worſe cloths than we at preſent make, the object was a leſs deſirable matter at the time, when there ſeems too great a diſpoſition to do it, without any incitement but what ariſes from the preſent ſtate of trade and the ſordidneſs of the manufacturers, to the injury of the ſtaple of fine ſtrong broad cloths, in which we have been hitherto unrivalled.

Another of the earlieſt objects of the Society's purſuit

purſuit was, the procuring a PERFECT HAND-MILL FOR GRINDING CORN. The difficulties under which the common people at that time laboured, with reſpect to the price, and adulteration of bread; and the change, or mixture of flour at the mills; rendered this an important conſideration: as every family, which ſuffered by theſe inconveniences, might by the aid of ſuch a mill, be enabled to avoid them, by grinding their own corn, and making their own bread. Beſides this general advantage, there were others, that would have accrued from the obtaining the perfect conſtruction of ſuch a mill, with reſpect to particular places, as well in Great Britain, as the colonies, where the difficulty or delay attendant on the ſending corn to public mills; or, in ſome caſes, the total want of them, or ſome ſuch commodious ſubſtitute; occaſions great embarraſſment.

The Society, therefore, offered a premium of fifty pounds to the perſon, who ſhould produce the beſt handmill: being ſuch as would anſwer the end. And in 1757, the premium was divided between two candidates, for two mills, which were thought to have ſome merit; though not to be perfect. Of theſe, one of them was a ſteel mill. In 1758, the whole premium of fifty pounds was given to another candidate: and the advertiſements were then diſcontinued. But a bounty of fifty pounds was afterwards given, in 1761, to a perſon who voluntarily offered ſuch a hand-mill to the Society, as was deemed preferable to thoſe before obtained.

The obtaining a complete hand-mill for grinding corn is a very deſirable matter; and was well worthy the attention of the Society. They took the beſt means in their power to obtain it; as well

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by their offer of premiums, as an attentive application to the examination and trial of the mills brought before them: and they expended an hundred and fifty pounds in the purſuit. But, nevertheleſs, though hand-mills, on thoſe conſtructions they have procured, will, in ſome degree, anſwer the purpoſe; yet the beſt of them is not perfect: and it ſtill remains as an object of mechanic invention, to find ſuch a conſtruction of a hand-mill for grinding corn, that will perform its office completely; and not be ſubject to ſome material inconvenience. The principal difficulty conſiſts in this circumſtance: That the weight of ſuch ſtones as can be commodiouſly moved by the hand, is not, like thoſe in large mills, ſufficient to bruiſe the corn to the ſtate of fine flour without a great velocity; and cloſe affixment of the ſtones, in the part where the fine pulverization is to be performed: and ſuch velocity and cloſeneſs not only wear the ſtones extremely faſt, and are liable to other mechanical inconveniences; but heat the flour till it concretes, or, to uſe the miller's word, *greaſe* it; and much deprave it in other reſpects. Iron mills are exempt from the firſt defect; and can be made to pulverize to any degree. But they heat much more than the ſtone mills; and are apt to damage the flour in a worſe manner, both by greaſing and ſmutting it. Beſides their being ſubject to ruſt, and even to be corroded, if they be not carefully preſerved from moiſture, and cleanſed: which requires more trouble and attention, than are generally beſtowed on ſuch matters.

The introduction of the MANUFACTURE OF PAPER from SILK RAGS was, alſo, early attempted by the Society. This was a new matter: as it does

not appear, that any ſuch paper had been before made in England.

The reaſons which prevailed on the Society to undertake it were theſe. It is well known that the Chineſe, among the various other materials of which they make paper, uſe waſte ſilk; and produce from it, ſome kinds, that are peculiarly adapted to particular purpoſes. Indeed, to thoſe who are well acquainted with matters of this nature, it is obvious, that any fibrous or filamentous animal or vegetable ſubſtance may be wrought into paper. From hence it was evident, that ſilk rags could be applied to the making a valuable kind of paper: and, as they are not at preſent converted to any uſeful purpoſe whatever, it was apparent, that a conſiderable loſs accrues to the public from the not employing them in this manner: ſuppoſing it practicable with relation to the returns and profits of the manufactures, who may undertake it. This was an exceeding good foundation for the Society to take up the matter, and try, by their intimation of the facts, and pecuniary encouragement, to induce ſome proper perſons to enter on the attempt of making ſuch paper.

Theſe had their deſired effect: and, in 1759, claims were made for very good ſpecimens of ſuch paper, and allowed. The firſt premium of twenty pounds, and ſecond premium of ten pounds, were adjudged to two candidates. The ſame premiums were again given in 1760. But, at that time, there appeared, from the experience which the candidates now had, a very great obſtacle to the progreſs of this manufacture. The varying colour of the ſilk rags, as they are promiſcuouſly collected, ſubjected every parcel of them to be of a different colour: unleſs they were aſſorted, and uſed

uſed ſeparately, or mixt in regular proportions. This rendered the parcels of paper produced of correſpondent different colours, where the aſſorting was not practiſed; and prevented the manufacturer from being able to ſupply conſiderable orders according to any ſpecimen, by which they had obtained ſuch orders. The aſſorting the rags ſeems, indeed, an obvious and certain remedy for this inconvenience. But it was found to be attended with ſuch an expence, as the price, for which the paper could be ſold, would not bear: and, moreover, the mixture of colours, when the whole ſet was taken in, produced a brown of a darker hue than was deſired in this kind of paper. Hence aroſe a diſcouragement to the manufacturers: and the Society took it under their conſideration to procure a remedy for it. They therefore, in 1760, offered a premium in the following manner.

"For making ſilk rags more commodious, and "ready for the uſe of the paper manufacturer, to "ſave him time, and the ſorting and ranging them "in ſeveral claſſes, as is now the practice, the So- "ciety will give a premium of ten pounds to "any ingenious perſon, who ſhall, on or before "the firſt Tueſday in December next, diſcover, "and produce to the Society, the moſt effectual "method, by ſome eaſy, expeditious, and cheap "proceſs, how the various colours may be readily "diſcharged out of a large quantity of ſilk rags: "which, when thus diſcharged of their colours, "ſhall, nevertheleſs, ſtill keep their ſtrength firm "as before; and be no ways rendered unfit, by "ſuch proceſs, for the purpoſe of making ſilk pa- "per; in order that ſuch method may be publiſh- "ed for the benefit of the paper manufacturer."

"N. B. All

"N. B. All perſons are deſired to ſave their ſilk "rags."

A claim was made of this premium. But the method propoſed was too expenſive and laborious to anſwer the end; and was, therefore, rejected. A member, who was particularly well verſed in matters of this kind, had at this time made himſelf maſter of ſuch a method, as would have anſwered: and he promiſed to lay it open to the Society: in conſequence of which the advertiſements for the premium were diſcontinued. Some accidents, however, prevented this from being done: and the great multiplicity of objects, which, at that time, occupied the attention of the Society, occaſioned any further proceedings, with regard to ſilk paper, to be neglected. It were, nevertheleſs, to be wiſhed, as the difficulty with reſpect to the colour of the rags could be removed, that this laudable attempt ſhould not be fruſtrated; as it will be, without further means be taken on the part of the Society to effectuate it. They have produced proofs, by the ſpecimens now in their hands, of the practicability of making ſuch paper, even commercially conſidered, when the obſtacle of the colour of the rags is removed, as it eaſily may be. They have, alſo, by the ſame means, ſhewn the utility of ſuch paper. The furniſhing the knowledge of diſcharging the colour from the rags, together with ſome moderate encouragement to begin a manufacture, would, in all probability, eſtabliſh this article; and procure the making a kind of paper wanted much for ſome material purpoſes; as well as prevent the total waſte of ſilk rags which now prevails.

The Society very early took up, as we have before ſeen, the improvement of HAND MILLS: and ſenſible of the great importance of grinding corn

in

in any way, well, and at cheap rates, they extended their views to other mills for that purpoſe. They not only endeavoured to effect this matter, by mechanical improvements, but by the procuring more eaſily the moſt important part of all ſuch machines; the MILLSTONES. On obſerving, that the only good ſtones of this kind were to be obtained from France; and, conſequently, that few others were employed; they thought this concern well worthy their conſideration. The purchaſing theſe ſtones of foreigners occaſioned a national loſs of ſo much as the price we paid for them. The diſtance of conveyance rendered them of courſe dear; and gave a temptation, in ſome caſes, to uſe a leſs perfect kind. And the public were, beſides, ſubject to ſome danger that accident or deſign might ſome time deprive us of the means of obtaining them on any terms. It was, likewiſe, reaſonable to believe, that, in the great varieties of quarries, which our country, and, indeed, all that have mountainous parts afford, ſuch a kind of ſtone might be found, as would be equal, or perhaps ſuperior to the beſt we obtain from foreigners for this purpoſe. Theſe reaſons induced the Society to take up this matter: and, perhaps, when well weighed, they will appear very momentous.

In 1758, they publiſhed the following advertiſement of premiums for millſtones.

"The price of mills for grinding corn, being "greatly increaſed, by the uſe of French, or other "foreign millſtones: and it ſeeming probable, "that ſtones of the ſame, or at leaſt as good a "kind, may be found in this kingdom, the So- "ciety propoſe to give for making and producing, "on or before the firſt Wedneſday in April 1759, "the beſt and cheapeſt *pair of millſtones*, not leſs

"than

" than twenty-five inches diameter, of Engliſh " ſtones or burrs, that ſhall be neareſt in goodneſs " to the millſtones made of French burrs, for " grinding wheat, and other grain, fifteen pound.

" For the ſecond beſt, ten pounds.

" For the third beſt, five pounds."

This premium was gained in 1759, by two claimants, for millſtones, which met with the approbation of the Society. Their reſolutions on the merits of them were, " that they anſwered in every " reſpect to the terms of the advertiſement." But that did not require them to be equal to the beſt French millſtones: and we may conclude, they were not. Since they have not excluded the uſe of the French: which ſtill maintain the reputation of being the only good millſtones. The Society, however, diſcontinued the premiums, thinking they had done all in their power to promote the object of them: which was, to give ſuch an intimation to the public, of the utility and probability of finding good millſtones in England, as might procure a due regard to it. And, though this attempt has not had, hitherto, a ſucceſs adequate to the views of the Society; yet, it is to be hoped, as the diſcovery of ſuch a kind of ſtone may be attended with great emolument, both to the proprietor and the public, it will engage thoſe, who are properly ſituated, to make the purſuit; and be at length the means of attaining the Society's end in this matter.

The mechanical improvement of *corn mills*, wrought by *water* and *wind*, was likewiſe taken in hand, with ſpirit by the Society; and with a ſucceſs, that cannot fail to produce real advantages to the public.

The conſtruction of common water-mills was already

ready carried to ſuch perfection, at the time the Society embraced this object, that it ſeemed needleſs to offer any premiums on their account. But the conſtruction of that kind, called TIDE-MILLS, which require a peculiar mechaniſm to adapt them to the action of the ſtream, conveniently, conſtantly, and advantageouſly, was in a much cruder and leſs improved ſtate; and, conſequently, appeared to admit of being brought nearer to perfection by due encouragement.

The public utility of tide-mills is very conſiderable. Water-mills, which work continually, have a great advantage over wind-mills: as they are ſubject to be frequently and long ſtopt, on account of calms, or to be deſtroyed by ſtorms, to the inconvenience, and ſometimes even diſtreſs of the neighbourhood, which depends on them for the grinding their corn. Water-mills are, therefore, juſtly preferred, where the preſence of a proper ſtream gives an opportunity of uſing them. And, as there are many ſituations on the banks of creeks of the ſea, or large rivers, where there is not a conſtant current, but only a flux and reflux from the tide, it was neceſſary, in order that theſe mills might be more generally erected, to invent a peculiar conſtruction, which might render them capable of working under this change of the courſe of the current; and under that very great additional difficulty, the conſtant alternate riſe and fall of the level of the ſurface of the water. But theſe difficulties being ſurmounted, a number of places, now deprived of them, might be provided with water-mills, not only for corn; but for other offices ſubſervient to manufactures and commerce.

The advance, however, towards a perfection in the conſtruction of ſuch tide-mills, not having then gone

gone far, the Society, in 1759, therefore, offered a premium of fifty pounds to the perſon, who ſhould invent, and produce to them, the beſt model of a tide-mill; ſuch model being capable of trial by water.

In 1760, two claims were allowed: and twenty pounds were adjudged to each of them. In 1761, the whole premium of ſixty pounds was given to a candidate; the conſtruction of whoſe model was deemed to have great pretenſions: and another candidate, having produced a model of ſome merit, a bounty of ten guineas was given to him. The Society now diſcontinued their premium reſpecting this object: the end being preſumed to be anſwered. But, in 1762, another model, conſtructed on principles different from the others, having been produced to them, they gave a bounty, to the inventor, of twenty guineas. The Society, retaining thoſe models in their repoſitory, have procured, to thoſe, who may be diſpoſed to enter on ſuch an undertaking, the means of erecting tide-mills on an improved and good conſtruction; and, conſequently, have furniſhed an encouragement to the encreaſing the number of ſuch mills: which, in many places, particularly near the ſea-ſhore, or when ſmall ſtreams are wanting, but where creeks and large rivers are found, would be of great utility to the reſpective neighbourhoods, and of courſe to the public, by conducing to ſupply the poor more cheaply and eaſily with bread.

The accidents and variation of the moving power to which WIND-MILLS are ſubject, occaſion the perfect conſtruction of them to be an object of far greater art and difficulty than that of water-mills, moved by a regular current. Many attempts had been made to remedy the defects: but much was ſtill

left behind, to render them capable of acting under all circumſtances with the greateſt power; and yet not liable to the damages or deſtruction, which ſudden violences of the wind might occaſion. This made the improvement of them a very fit ſubject of the Society's regard: and they, accordingly, took the ſame meaſures to effectuate their views, as in the caſe of tide-mills.

In 1759, they publiſhed this advertiſement.

"To the perſon, who ſhall invent and produce "to the Society, on or before the firſt Tueſday "in April 1760, the beſt model of a wind-mill, "in which the number, form, ſize, and poſi- "tion of the ſails are ſuch, as produce the greateſt "effect from the action of the wind in all its vari- "ous velocities; and the machinery of the whole "to communicate, in the moſt ſimple manner, a "proper uniform motion to the ſhaft of the mill, "in all the variations of the wind's velocity. The "model to be made by a ſcale of one inch to the "foot. Fifty pounds."

This premium was claimed in 1760, by one candidate: to whom the whole fifty pounds was adjudged. In 1761, a bounty of fifty pounds was given to a perſon, who produced to the Society a model, which was deemed ſuperior in merit to the former one. And, in 1762, a like bounty of fifty pounds was given for another model of ſtill greater merit than any before offered to the Society.

In 1761, there being reaſon to believe, the attention of all thoſe, whom the Society's premiums might lead to engage in ſtudy or experiment on this ſubject were incited; they diſcontinued the premium: and the public owe to their encouragement the ſeveral very material improvements in this moſt important machine; ſome of which have been ſince carried

carried into practice. The benefit of theſe improvements, it is preſumed, will now be more largely extended: as the public will be more generally apprized of the merit of them; and as they may be brought into uſe by any deſiring it, in conſequence of the models retained by the Society: who, on application, through any member, or by other means, permit the liberty of having ſuch draughts, or meaſurements of them made by workmen, as may be neceſſary for the erecting the machines in large.

There ſeems only one further improvement wanting with reſpect to wind-mills: and that is now under the conſideration of the Society, in conſequence of ſome models, which have been lately brought before them. It is, a perfect conſtruction of an horizontal wind-mill. Many conſtructions of ſuch mills have been produced: but none of them, which are publickly known, are free from thoſe defects and inconveniencies, that render them inferior to the vertical wind-mills. It is certain, however, from the tried fact itſelf, that a well conſtructed horizontal wind-mill is preferable to the beſt vertical. There is now in Suſſex ſuch a mill; which has been continually in uſe near thirty years: and the proprietor, who has great ſkill and experience in this way, is now going to erect another very large one. A teſtimonial of his opinion of the comparative ſuperiority of horizontal to vertical windmills, given to his ſon, is in the hands of the Society. It were much to be wiſhed, that his or ſome other good conſtruction of ſuch a mill were known: as this kind of wind-mill might be erected at a much leſs expence than the common vertical mills, and be exempt from the danger of being deſtroyed by ſtorms, to which they are ſubject:

whence would reſult an encouragement to erect wind-mills, where they are now wanted.

The manufacture of CHIP and STRAW HATS for women, was likewiſe another matter the Society early ſet about to encourage. The chip hats of that kind make a very conſiderable article of commerce at this time. The Italian ſtraw hats, commonly called *Leghorn hats*, were alſo, at the time the Society took up this matter, greatly in uſe: but the change of a faſhion has ſince much leſſened the demand for them; and increaſed proportionably that of the chip hats. Theſe hats, being purchaſed of foreigners; and being, moreover, the produce of labour, and principally that of women and children; there appeared no reaſon, why we might not ſupply ourſelves with what we demanded: if the art of making them was well underſtood; and ſome proper manufactories eſtabliſhed, to give the example, and put this matter in a right train.

Accordingly, in 1760, the Society advertiſed, that they would give ten guineas to the perſon, who ſhould produce the greateſt number of chip hats, not leſs than a dozen, to be made in England, neareſt to the beſt Italian, in lightneſs, ſtiffneſs, and workmanſhip: and five guineas to the perſon, who ſhould produce the next greateſt quantity under the ſame limitations. In the year 1761, the Society thought fit to make an alteration in their advertiſement for this article, requiring the perſon, to whom the premium ſhould be adjudged, to undertake to ſupply a quantity, not leſs than two hundred dozen, if demanded, at a ſtated price, to be given in by him, along with a ſample, not leſs than twelve, to the Society. In 1762 a further alteration, ſtill, in the advertiſement for chip hats, took place, as well as in the premium. For

now

now the Society offered three guineas each, to ſuch perſons, as ſhould make and produce, at leaſt, a dozen good chip hats, made in the manner of the Italian. But if there ſhould happen to be more than ſeven candidates intitled, then twenty-one guineas to be divided among them, according to the quality, goodneſs, and cheapneſs of the hats. And to the candidate, whoſe hats ſhould be deemed the beſt among the whole, two guineas over and above the three given in common with the reſt: the Society, at the ſame time, retaining a dozen of thoſe hats, which ſhould gain this additional premium. In 1763, another alteration, though leſs material, was again made in the form of the advertiſement. In this, the Society deſired two dozen of hats to be produced to them as a ſample: but agreed that only half a dozen of thoſe which gained the firſt premium, ſhould be retained. Every candidate was, likewiſe, directed to mention the price of their hats, and were to oblige themſelves to ſupply fifty dozen at the ſtated price given in, if requeſted of them. In 1764, the advertiſement remained as in the preceding year: and, in 1765, it was diſcontinued: the Society having, by this fair trial, carried their attempts to eſtabliſh this manufacture as far as lay in their power.

There were, in 1762, two claimants for the premiums for chip hats: and their performances were thought deſerving of what the Society had offered. Ten guineas were accordingly adjudged to one of them; and five guineas to the other. In 1763, there was only one candidate; to whom three guineas were given. In 1764, two claims were made for the premium; and five guineas, conformably to the advertiſement of that year, were adjudged to one; and three guineas to the other.

In 1765, the premium was again claimed by one perſon: and three guineas were adjudged to him.

The premium for ſtraw hats, like thoſe called Leghorn hats, was never obtained.

However, in the courſe of offering theſe premiums, the Society gained information, that one of the moſt advantageous materials for making ſtraw hats was not to be procured at preſent in England. This was a vegetable production called *platt*, that is to be obtained at the Bermuda and Bahama iſlands. It had been formerly brought from thence hither for that purpoſe; but ſince the loſing the manufacture of this kind of hats, probably from being underwrought by the Italians, the importation of it had been diſcontinued.

The Society, therefore, thought it a proper meaſure, in order to promote the re-eſtabliſhment of the manufacture of Leghorn ſtraw hats, to offer a premium for the importation of PLATT into England; and adverti ſed, in 1760, that they would give twenty pounds to the perſon, who ſhould import from the Britiſh American colonies, the largeſt quantity, not leſs than one ton weight, of that *ſpecies of platt*, which was heretofore brought to this country in conſiderable quantities, from the Bermuda, and the Bahama iſlands. And ten pounds were to be given for the next greateſt quantity, not leſs than one thouſand pounds weight.

The premium was not claimed: and the advertiſement was diſcontinued the next year.

It is not extraordinary, this was not claimed. For premiums, that are intended to operate in the colonies, have been found to have a ſlow effect: and, if not continued for a length of time, to fail of any. It is, however, leſs to be regretted, that the attempt to promote the importation of platt did not ſucceed;

ſucceed: becauſe the kind of hats, for making which it was intended, is but very little uſed in compariſon of what it was. The demand for chip hats is, on the contrary, much encreaſed: and the manufacture of them here is gaining ground. Whence we may hope, the event of the Society's proceedings, with reſpect to them, will be, the bringing at length the whole of this article into our own hands: which is more particularly valuable, as was before obſerved, from the kind of labour it requires; which employs the moſt helpleſs and burthenſome part of the community.

With reſpect to the Leghorn ſtraw hats, as the difference of the price of labour ſeems to be the cauſe why the Italians got it from us: it is not likely we ſhould recover it, while they can rival us with the ſame advantage. A prohibition of, or a great duty on, the Italian hats is therefore previouſly neceſſary to the ſucceſs of any premium on that ſcore.

The making CRAPES FOR HAT-BANDS, like thoſe imported from Italy, was another article of the ſame kind: which the Society then adopted, as an object of encouragement. The demand for theſe crapes was very conſiderable: and the labour being the principal part of the original coſt in the making them, rendered it ſtill more deſirable to us. As to the probability of our attaining the art, or the other means of eſtabliſhing this manufacture, there ſeemed to be very little reaſon to doubt of ſurmounting the difficulties, if any perſons of ſpirit would procure the information of the Italian method of practice with regard to it; and perſevere in thoſe trials, and efforts, which are neceſſary to bring newly introduced manufactures to perfection in a commercial view.

The Society, therefore, very properly, as the event has ſhewn, choſe this as one of the objects of their premiums: and they offered, in 1759, thirty pounds to the manufacturer, who ſhould make the largeſt quantity of crapes, not leſs than one hundred yards, to be nearly equal in goodneſs to the beſt foreign crapes. In 1760, the Society augmented their premium: and offered fifty pounds on the ſame conditions. And, in 1761, they diſcontinued the advertiſement. Theſe premiums were never claimed.

The little ſucceſs, which appeared to enſue, at that time, from the Society's premiums for the making Italian crapes, occaſioned a determination to ceaſe to offer them. And this was thought more expedient from a perſuaſion, into which they were led, that the proper ſort of ſilk, which was ſuppoſed to be the refuſe part, was not to be obtained in a quantity, or at ſuch a price, as would admit of the ſame kind of crapes being made here. But time ſurmounted theſe difficulties: and, though this manufacture could not be brought to maturity during the period in which the Society offered their premiums, it has ſince. The attention to this object, which their advertiſements had excited, was not remitted on the diſcontinuance of their premiums: but was kept up till the end was fully attained. In the beginning of laſt ſpring, there were produced, to the Society, ſome ſpecimens of crapes: which, on examination, by the moſt able judges, were allowed to be equal to the beſt imported hither from Italy. The gentleman, who had brought the manufacture of them to this perfection, gave ſatisfactory aſſurances, that theſe ſpecimens were not the product of a ſpeculative experiment; but, that he had really ſet on foot a con-

conſiderable manufactory; and was enabled to ſell the crapes full as cheap as the Italian could be afforded. As this gentleman, whoſe abilities have made him an alderman of the city of London, at an uncommonly early period of life; and whoſe ſituation, with reſpect to the ſilk manufacture, give him every advantage in this purſuit, has advanced ſo far in the rivalſhip of the Italian crapes, we cannot doubt, but that he will ſtill improve in this article, to the total excluſion of them. It is further hoped, that he will receive from the Society, the ſtrongeſt mark of approbation of his having completed one of their earlieſt views; and from the public, the honour that is due to him for having acquired to this country, whoſe whole dependance lies on its manufactures, a very conſiderable new article, at a time when we are loſing many others.

The reſult of the Society's early proceedings, with reſpect to crapes, has proved two matters, that are well worthy obſervation. The one is, that we ought not to conclude, with reſpect to any of the Society's meaſures, they have been ineffectual, and void of ſucceſs, becauſe they have not had immediate apparent effects in producing the deſired end. The other is, that we ſhould not be ready to receive as principles, to prove the impracticability of eſtabliſhing any new manufacture, the accounts of little difficulties and impediments, which have deterred particulars from undertaking them. We ſee, in this inſtance, and ſeveral others which have come before the Society, that time, aſſiduity, and ſpirit, ſurmount the ſuppoſed irremoveable obſtacles: and the public will hereafter find, that the Society's endeavours, in many other par-

particulars, have not been vain, though the fruits of them have not been yet reaped.

The introduction of the MAKING MARBLED PAPER *in England*, was taken up as an object of the Society's premiums, along with the preceding. This was an article for which we paid very great ſums to foreigners: and which had been frequently attempted in England, but without ſuch ſucceſs, as to ſupply any conſiderable part of our demand.

The Society, therefore, offered, in 1759, ten pounds to the perſon, who ſhould marble the greateſt quantity of paper, not leſs than one ream, equal in goodneſs to the beſt foreign imported. A ſample, of ſuch paper, to be left with the Society. In 1760, the Society altered their advertiſement; and greatly augmented their premium. This year, they propoſed to give fifty pounds to the perſon, who ſhould manufacture, in England, the beſt, and greateſt quantity, not leſs than one hundred reams, of marbled paper: and which was not to be any wiſe inferior to the beſt imported from abroad. The next year, 1761, they made an addition to the premium again, by offering twenty-five pounds for fifty reams, preſerving the form of the advertiſement of the firſt premium of fifty pounds, the ſame as it was the preceding year. In 1762, the premiums were the ſame as in 1761: but the advertiſement was altered: the Society imagining, upon juſt grounds, that the quantity of one hundred reams, which they required to be made, was much too large for an experiment: and therefore, reduced their demand to forty reams for the firſt premium; and twenty for the ſecond. This was their laſt meaſure taken for the eſtabliſhment of the manufacture of this article: for the next year they diſcontinued the premium for the making marbled

marbled paper: the end appearing then to be fully obtained.

In 1760, there was one claim for the premium offered in 1759. But, on inſpection of the ſample produced to the Society, it was found to be wanting in ſo many particulars, which were required by the Society in their advertiſement, that they deemed it not worthy of the premium. However, in 1763, another claim was made, to which the firſt premium of fifty pounds was adjudged. It was this claim, that determined the Society to diſcontinue their premiums for this article. For the ſpecimen was equal, if not ſuperior, to the beſt foreign marbled paper imported: and it appeared, that the candidate was actually ſetting on foot a conſiderable manufactory. The ſucceſs of this matter, has ſince been correſpondent to the proſpect then afforded. For we have now got this article, as far as regards our own conſumption, wholly in our own hands; and ſupply ourſelves with paper, of this kind, more elegant and beautiful than the foreign, we before uſed. The public, therefore, owe to the Society, in this inſtance, the obtaining a manufacture, that makes a very conſiderable national ſaving: much greater, perhaps, than appears probable, without examining the particular facts, that ſhow what the importation formerly was: or the conſumption now is.

Among the objects relating to mechanic arts, to which the Society early applied their attention, the procuring the *introduction of* SAW-MILLS *into uſe in England*, was one of the moſt capital. The Dutch, and the northern countries of Europe, have found great account in theſe machines: many of which are kept at work for the deal and plank ſent hither; at the ſame time that we have been ſo ſupine,

ſupine, as to neglect this advantage; and even ſend wood, purchaſed in the Baltic, and other parts of the North, to be ſawed there, before it was brought to us. It muſt be allowed to appear, an extraordinary fact, that, in a country, where great efforts are made to every kind of improvement, and particularly ſuch as depend on machines, this matter ſhould be ſo long almoſt totally diſregarded; notwithſtanding the obvious benefits of it, as well to the public, as the private undertakers of it in proper ſituations. There were, however, two circumſtances, that have contributed to deter thoſe, who might otherwiſe have been diſpoſed to it, from erecting ſuch mills here. The one is, a ſtrong apprehenſion, which moſt people had, that the populace might be incited to a violent oppoſition againſt it, under the notion, that it had a tendency to take away the bread of thoſe, who lived by ſawing with the hand The other is, that it was almoſt univerſally believed, the erecting ſuch mills was prohibited by act of parliament on the ſame account; and could not, therefore, be done without a breach of law; and the incurring ſome penalty. This opinion has long prevailed; and was, perhaps, the principal cauſe, why ſo few attempts were made to eſtabliſh ſuch mills here.

The belief of a legal prohibition of ſaw-mills was, nevertheleſs, entirely without foundation, both as to the fact itſelf, or the reaſon. There never was any ſuch act of parliament: and ſo far from its being neceſſary, it is evident, that a prohibition of ſaw-mills would have been injurious to the public; and no way advantageous to any particular ſet of men. The far greateſt part of the wood, we uſe, is brought to us from abroad, already ſawed: and we pay for the work of it to foreigners.

reigners. If we had ſaw-mills of our own, to do ſuch work, we ſhould ſave that expence; and employ our own people in performing it. The foreign ſaw-mills, therefore, equally underwork our ſawyers, as our own would, if we had ſuch. For this matter is ſo well underſtood, that if wood can be brought over cheaper in proportion in that ſtate, than unſawed, it will be brought ſo. But if we can do this work as cheap ourſelves, it will be brought over in the log; and we ſhall employ our own hands in the work. The ſawing cheap here will, moreover, tend to the importation of American timber; as the higher price of labour there prevents them from furniſhing boards near ſo cheap in proportion as they can log.

The Society, influenced by theſe reaſons, thought the matter well worth their regard: and were, at the ſame time, ſenſible, that nothing more was requiſite to the introduction and eſtabliſhment of ſaw-mills, than to remove the errors and prejudices that deterred from ſuch an attempt; and to procure one or two examples to be ſet, of the erecting ſuch mills, in order to lead others.

The Society, therefore, offered as a premium, to the perſon, who ſhould firſt erect a good ſaw-mill, and work it for one year, one hundred pounds; and for continuing to work the ſame the next year, fifty pounds; as alſo, twenty-five pounds for each of the ſucceeding three years he ſhould ſtill go on to keep the mills in uſe. And at the ſame time they gave aſſurances, that the opinion of the illegality of ſaw-mills was without foundation.

All theſe premiums were obtained by Mr. James Stansfield, then living in Yorkſhire, who had before erected a more imperfect mill: which he pulled down, and made a new one of a good conſtruction:

ſtruction: having rendered himſelf maſter of it by going to Norway, and Holland, to inſpect the beſt mills to be found there.

The laſt time Mr. Stansfield came to London, to receive the premium for working his mill, he brought with him a complete working model of a ſaw-mill; and offered it to the Society, on ſuch terms as they ſhould think fit. As an encouragement to him to make further improvements, and as a mark of approbation of his aſſiduity to promote their views, they gave him a gratuity of one hundred pounds: and are now poſſeſſed of the model for the aſſiſtance of any, who may be deſirous to erect a ſaw-mill.

Application was afterwards made to the Society for a model, in order to its being ſent to America: which they determined to procure at their own expence; and agreed with Mr. Stansfield, to give him fifty pounds for it. In this model, Mr. Stansfield had made an additional improvement: which was a croſs cutting ſaw, for dividing the logs into proper lengths. The Society gave him, on this account, ten pounds more than the ſum agreed to be paid to him: and the improvement was added to their former model. The model procured for that purpoſe, was accordingly ſent to America; and the good effects of it have been acknowledged in the ſtrongeſt terms, by the governor of one of the colonies, and ſome other principal perſons: who ſay, great improvements have been made from it in their ſaw-mills.

With reſpect to the introduction of the uſe of ſaw-mills in England, the Society thus gained the firſt point, of ſhowing, that ſuch machines were not againſt law: and of ſetting an example to others of erecting them, by that which they had thus

thus procured to be wrought in Yorkſhire for five years. But theſe meaſures had not, however, the immediate full effect in England, either to the public, or to Mr. Stansfield, which might have been hoped for. Having placed his mill in a corner of the country, where there was not an adequate conſumption of timber; and not having ſufficient fortune to go into a project of buying log, and ſending it, when ſawed, to diſtant places; he failed of getting ſufficient work for his mill: and, having ſtruggled with this difficulty, for two or three years, after he received the laſt premium of the Society, he determined to go to America, where he might have a better opportunity of availing himſelf of his knowledge and experience in this matter. The ſame remoteneſs from the capital, which made Mr. Stansfield miſcarry in his attempt, retarded alſo the effects of the Society's endeavours to introduce the uſe of ſaw-mills, by the example. For, in that diſtant corner, it had no influence: and this mill remained as much a matter of meer ſpeculation, as thoſe in Holland or other countries.

But, though the Society's efforts had not a ſpeedy effect, they were, nevertheleſs, in the end, the means of bringing about the deſired conſequence. For Mr. Stansfield being come to London, with the view, as abovementioned, of going to America, he was introduced by ſome reſpectable members of the Society to Mr. Dingley: who had very great concerns in the importation of timber. The repreſentations of theſe gentlemen; the countenance the Society had given to Mr. Stansfield; and the opinion, their proceedings had impreſt on Mr. Dingley, of the utility of ſaw-mills to the public; diſpoſed him to treat with Mr. Stansfield. Terms were ſettled betwixt them: and, Mr. Dingley

ley informing the Society, of his having taken it into conſideration to erect a ſaw-mill at Limehouſe, with the aſſiſtance of Mr. Stansfield, in caſe he had their further recommendation and ſanction of that meaſure, they immediately teſtified their approbation of his deſign; and publiſhed the following advertiſement:

"Mr. Dingley having propoſed to the Society, "in conſequence of their recommendation of ſaw-"mills, to erect one at Limehouſe, for the cheaper "and better ſawing timber into planks, boards, &c. "Reſolved, it is the opinion of this Society, That "his laudable deſign may be of great utility to "the public, in ſaving the expence of ſuch ſaw-"ing, now paid to foreigners; and in promoting "the importation of logs from his majeſty's do-"minions in America."

Mr. Dingley then agreed to retain Mr. Stansfield for a term of years; and to build a complete ſaw-mill, to be wrought by wind, at Limehouſe. This was accordingly finiſhed in December 1767: at which time Mr. Dingley gave notice to the Society, that he had carried his deſign into execution; and deſired they would inſpect the mill. A committee was accordingly appointed to viſit this mill: and it appeared to them, to be erected on the moſt approved conſtruction, at a very conſiderable expence. It appeared, alſo, to be ſituated with great convenience as to water carriage; eſpecially when the intended new canal into the Thames ſhall be finiſhed. It was made to work twenty ſaws: and the whole was fabricated under the direction of Mr. Stansfield; and allowed, by very good judges, to be executed in a perfect manner.

The Society, to teſtify, in the moſt honourable way,

way, their approbation of Mr. Dingley's having thus effectually promoted their views in this matter, preſented him with their gold medal, with this inſcription, *To* CHARLES DINGLEY, *Eſq; for his promoting the views of this Society, by erecting a complete ſaw-mill at Limehouſe.*

The Society have thus at length accompliſhed their purpoſe of introducing the uſe of ſaw-mills in England. It was brought about by their having firſt procured, by their premiums, a ſaw-mill to be erected, and wrought for ſeveral years at a diſtance from London; and by their having afterwards invited, through their recommendation and ſanction, a private gentleman, whoſe diſpoſition, fortune, and ſituation peculiarly fitted him to undertake it, to erect another near the metropolis, with the aſſiſtance of the perſon, who had received the Society's premiums, to the amount of three hundred and ten pounds, and been thence enabled to make himſelf a perfect maſter of the ſubject. For it cannot be doubted, but that Mr. Dingley's ſucceſs in this concern, will ſoon induce others to endeavour to ſhare with him the great private advantages of employing a machine, that will ſave ſo much expenſive labour here. Mr. Dingley's mill has, indeed, at a very riotous period, been damaged by a mob; but a national indemnification, and the puniſhment of ſome of the rioters now taken, will doubtleſs effectually diſcourage ſuch attempts for the future. The introduction of the uſe of ſaw-mills in England, muſt be, therefore, enumerated among the advantages to the public, which are unqueſtionably owing to the Society.

The *making by the* LOOM, PIECES *of* SILK, COTTON, LINNEN, *or* WOOLEN, *in imitation of the* MARSEILLES *and* INDIA QUILTING, was

brought from obſcurity, next to oblivion, and nouriſhed into a valuable manufacture by the Society's encouragement. This art of performing, by the loom, theſe kinds of quilting, in a more elegant, full wrought, durable, and much cheaper method than by the hand, was firſt invented by perſons, who, for want of encouragement, or means to purſue it, had laid aſide, and wholly neglected it for ſeveral years: and there is the greateſt room to believe, that without the intervention of the Society, it would have been intirely loſt.

In 1761, a piece of this kind of quilting was produced to the Society: and appearing an ingenious performance, which promiſed to be of public utility, they had it under their conſideration to give a bounty to a perſon who claimed the merit of the invention. But it happening that this claim of invention was diſputed; and that other perſons, beſides he, who applied, were poſſeſt of the art, the Society deſiſted from giving any bounty; and determined to throw out a general encouragement to the improvement and practice of the art.

They accordingly offered the following premium in 1761.

"To the perſon who ſhould produce to the So-
"ciety, a quantity of quilting, not leſs than ſixty
"yards, made in England, in a loom, in imitation
"of, and neareſt in goodneſs to, the Marſeilles or
"India quilting, forty pounds: and to the perſon
"who ſhall produce, not leſs than thirty yards, twen-
"ty pounds. The premium to be determined by the
"goodneſs and cheapneſs, in caſe of competition.

In 1762, alterations were made in the advertiſement: and the premium greatly augmented for this article. For now the Society offered fifty pounds for a quantity, not leſs than ſeventy yards

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in length, and three quarters and an half in width; thirty pounds for fifty yards; and twenty pounds for forty yards. A yard of each piece that ſhould gain the premium, to remain the property of the Society. In 1763, the premium was again offered, and the advertiſement continued the ſame. In 1764, the Society propoſed the like premiums, under the ſame reſtrictions as in the preceding year, for the greateſt improvement in quilting in the loom, in imitation of Marſeilles or India quilting, either in ſilk, cotton, or linnen. But they now extended their views further, in bringing this art to the greateſt perfection, by an additional premium of one hundred pounds for quilting *woollen* in the loom, after the manner of Marſeilles or India quilting. In 1765, all the premiums for theſe articles were diſcontinued.

In conſequence of theſe advertiſements, two candidates, in 1762, brought their productions to the Society in claim of the premiums: and they were thought to have ſuch merit, as fully intitled them to the premiums, which were accordingly adjudged to them. In 1763, there was no premium given. But, in 1764, there were three candidates: and they had then carried this manufacture to ſo great a degree of perfection, that the whole premiums were adjudged to them, in the reſpective proportions of fifty, thirty, and twenty pounds. In 1765, the premiums were again adjudged to three candidates: one of whom had obtained the firſt, and another the ſecond premiums of the laſt year; and met with the ſame ſucceſs this year: the Society having allowed the whole of the premiums. In this year, alſo, there were three claimants for the premiums for quilting woollen; and they had attained to ſuch excellence, in this firſt

attempt, that the Society gave them the premiums for that article.

Theſe premiums had thus the deſired conſequences, not only in the multiplicity of the claims; there being many others beſides theſe we have mentioned to which the premiums were allowed; but in the improvement which the reſpective pieces demonſtrated to have been made in this art, comparatively with its ſtate when the original ſpecimen was produced to the Society. They, therefore, very properly continued the premiums for theſe ſeveral years, during which time, ſtill more perfect performances were preſented in claim: and ſuch as evinced this manufacture had received all the aid that could be given in this way. The premiums were, on that account, then diſcontinued: and the Society muſt be allowed to have completed, as well as begun, the introduction and improvement of this curious and advantageous uſe of the loom: which is now applied to ſeveral material branches of manufacture, beſides the weaving large pieces in imitation of the Marſeilles and India quilting, that are ſuperior to them in every quality.

The making what are called CAT-GUT STRINGS *for muſical inſtruments*, was an object the Society very early thought of encouraging by a premium. But while they had the mode under their conſideration, they were informed a perſon had already brought this affair to very great perfection. The Society therefore deſiſted from offering any premium for this article, till they had examined a ſpecimen that was produced to them for their inſpection. They accordingly appointed a time for this buſineſs; and the perſon attending who had manufactured the ſtrings, went through the proceſs of making them before a committee. Several

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other perſons appeared alſo, who certified they had tried theſe ſtrings: and that they had found them to be equal in goodneſs to the foreign ſtrings, and much cheaper, at the price for which they were offered. They further declared, that it would be a matter of the greateſt conſequence to have ſuch a manufacture eſtabliſhed in England; as the people abroad, from whom they imported the ſtrings for muſical inſtruments, ſupply them frequently with ſuch as are bad; and at an exorbitant price. That, moreover, however trivial this matter might appear at the firſt view, under the notion, that fiddle-ſtrings were of very little conſequence, yet, that in a commercial light this article of trade was of great importance: as it is certain we pay ſeveral thouſand pounds a year, according to the eſtimation of ſome, more than twenty thouſand, for ſtrings for muſical inſtruments, that might, as far as appears, be ſaved to the public, by employing our own people in the work; and uſing materials of our own produce, that now turn to very little or no account. Upon this information, the Society thought proper to give ſome encouragement to the perſon: and accordingly voted her a bounty of ſix guineas. During the time this matter was under the conſideration of the Society, another perſon petitioned to lay before them ſome cat-gut manufactured by himſelf: declaring alſo, that he was then carrying on a pretty extenſive manufacture of this article. The Society accordingly appointed a time for him to attend them: when it appeared upon various trials of the ſtrings, made by competent judges, that they were not only better than the others, for which the bounty was given; but ſuperior to the foreign. The quickneſs of the proceſs was, alſo, an additional merit. Indeed ſo expe-

ditious was it, that the candidate, in the preſence of the committee, in leſs than three hours time, prepared, from the raw guts, ſeveral ſtrings fit to be ſtrung on a fiddle; and played on immediately. The ſtrings appeared good alſo; as they had no other fault than being ſomewhat rough when played on: which was imputed only to their newneſs. In other reſpects, they were declared to be equal to the beſt Roman ſtrings. The Society, therefore, upon the repeated declarations of various people of the goodneſs of theſe ſtrings, gave the manufacturer of them a bounty of ſix guineas. The firſt perſon afterwards made another application: declaring the pretenſions of a further improvement: and that the ſtrings now made by her method, were equal to the beſt, called the Roman. But, on a trial, before a committee, by a muſician, the contrary appeared: and the ſtrings broke on being tenſely ſtretched, and played upon. No further bounty was, therefore, given to this perſon; nor any other meaſures ever taken by the Society reſpecting the matter.

The procuring perfect cat-gut ſtrings, for muſical inſtruments, to be made at home, to the total excluſion of the foreign, was, nevertheleſs, certainly a matter of conſequence; and worthy the Society's notice, at the time they took it under their encouragement. But, it is now become of more importance: as the demand for ſuch ſtrings is much greater, and the price of the foreign exorbitantly raiſed, at the ſame time they are ſent over much worſe in quality. It would be, therefore, beneficial to the public, in a commercial light, to gain this article: and even for the improvement of muſic with us, which is not leſs a *polite* or *liberal art* than painting, it were to be wiſhed we ſhould attain

tain to perfection in the manufacture of cat-gut ſtrings. There is not the leaſt doubt of the practicability of it, if proper methods were to be purſued. Becauſe the Italian ſtrings are made of the guts of ſheep: which, it is obvious, are to be obtained at the ſmalleſt expence, in any required quantity. The knowledge of the art only ſeems wanting: and, that might be eaſily obtained at Naples, where the beſt ſtrings are made: and called here by the name of Roman. It is probable this miſtake, in the name, aroſe from their being firſt brought to us from Rome, though that place is itſelf ſupplied at this time from Naples. The Society's views might, by this means, be compleated; though they have failed, in ſome degree hitherto, from the want of more accurate knowledge in the perſons who attempted this manufacture. One of the candidates uſed lambs guts twiſted together, inſtead of a ſingle gut of greater thickneſs; in conſequence of which, the ſtrong, firm, and even texture, found in the beſt ſtrings, were wanting. As this matter ſeems yet within the reach of the Society's influence, as well as meriting their further regard, it is hoped, ſome means will be purſued to incite the gaining a full information of the manner of making theſe ſtrings, as beſt practiſed at Naples: which is all that can be wanting to the introduction of this manufacture with us.

The improvement of the Loom for Weaving Stockings was another matter, which the Society took upon them to encourage. The very great benefits, which this moſt uſeful machine, though of modern invention, produced to the Britiſh commerce, by ſaving labour in the manufacture of ſtockings, at a time when the advanced price of them with us, would have thrown this article into

the hands of foreigners, rendered the attempt to bring it to ſtill greater perfection well worthy the regard of the Society. This ſeemed more peculiarly an object of their conſideration: becauſe the conſtruction of this loom was, at that time, complex; and though capable of producing the general effect, yet not exempt from ſeveral defects, and inconveniences. The improvement of this machine, therefore, was, in fact, the improvement of a manufacture, not only neceſſary with reſpect to our domeſtic uſe; but which makes a very conſiderable article among our exports.

The Society, accordingly, in 1764, advertiſed, that they would give to the perſon who ſhould make the greateſt improvement in the ſtocking frame, one hundred pounds. In 1765, they again advertiſed the ſame premium. But a conſtruction of a frame, of which the principal merit was ſimplicity, having obtained the premium, the Society now mentioned, that the fineneſs of the gage of a frame, fit for working ſilk, would be conſidered as a part of its merit. In 1766 they diſcontinued their premium for this machine.

The premium offered in 1764, was claimed in 1765, by ſeveral candidates: and gained by one. The Society were of opinion, that his loom was an improvement of the ſtocking frame then commonly uſed, for theſe reaſons: that it is much more ſimple; can be made at about one third of the expence of the common frames; and may be uſed by young practitioners with more eaſe and certainty than the common frames.

The next year, there were again ſeveral other candidates: and among them one, whoſe ſuperior merit not only appeared on examination, but was atteſted by a conſiderable body of manufacturers

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in the country; who had ſet on foot a ſubſcription to reward the inventor concurrently with the Society. The Society, therefore, gave the whole premium to the candidate, with theſe approbatory reſolutions on his pretenſions. That the frame has great advantages over the common frame; that it is more durable, lighter, and cheaper; that a man can work in it three or four hours in a day longer than in the common frame; and that it will admit of any degree of fineneſs in the gage.

The Society have thus a full claim to the merit of having procured, by their premiums, two very great improvements, ſuch indeed as render it complete, of a machine extremely important to the Britiſh commerce in its preſent ſtate. And they ſtill conduce to render the conſequences of this improvement more general, by keeping a complete machine of each of theſe conſtructions, as models, in their repoſitories, for the uſe of thoſe, who may be diſpoſed to have ſtocking-frames, made on a ſimilar conſtruction for their own ſervice.

The *making* POINT LACE, *in England*, was, alſo, an art, which the Society thought to deſerve ſome encouragement. The working the flowers being the principal part of the labour, and performed by the hand, it was imagined, that the introduction of that manufacture would not only be a ſaving of the money ſent abroad for this article; which was at that time conſiderable; but employ a number of women of middling rank, who at preſent are ſupported by their relations, or ſtruggle with difficulties from the ſmallneſs of their fortunes, and the preſent great expence of living. The Society was, moreover, particularly induced to lend an attention to this matter, from the application of a milliner, who declared, ſhe had aſſiduouſly employed

ployed herſelf to promote this matter, by inſtructing young gentlewomen to work flowers for point; and taking the produce of their labours, to be wrought into point lace, and diſpoſed of in the courſe of her trade. The Society, therefore, gave her the ſum of ten guineas for her information on this head; and as an encouragement to proceed in her deſign: and they alſo offered the following premium in 1762.

"To the perſons who ſhould make the flowers of "point lace, after the manner of the Bruſſels; and "produce a ſufficient number for half a yard of "point lace, to be ſowed on the paper pattern with "the deſign drawn on it; and which paper pattern "muſt not be leſs than two inches and an half broad; "ſixty guineas. The elegance of the pattern, fine-"neſs, neatneſs, and lightneſs of the work, to deter-"mine the preference." The ſixty guineas were to be divided among the candidates, in proportion to their merits: but no candidate was to have more than fifteen guineas. In 1763, the advertiſement continued the ſame. But, in 1764, the Society altered it thus; and offered, "To the perſons who "ſhould make the fineſt pair of men's ruffles, and "frill, complete, in imitation of Bruſſels point lace, "each ruffle not to be leſs than forty-two inches in "length; the breadth, in the wideſt part, to be no "leſs than two inches and three quarters; and, in "the narroweſt part, not leſs than two inches; ſixty "guineas, to be divided among the candidates, in "proportion to their merits. But no candidate to "receive more than twenty guineas. The elegance "of the pattern, fineneſs of the ground, clearneſs "of the open work, and lightneſs of the flowers, "to determine the preference."

In conſequence of theſe advertiſements ſeveral claims

claims were made on the Society for the premiums on this article. In 1763 there were three candidates, to whom thirty guineas, part of the premium of ſixty, were adjudged in the proportions of twelve, ten, and eight guineas. There was, however, another perſon, who offered her performance to the Society in claim of the premium: to whom though, from the want of conforming to the conditions ſpecified in the advertiſement, the Society could not allow the claim, yet they thought the production to have ſo great a ſhare of merit, that they gave a bounty of ten guineas. In 1764, there were again three candidates: one of whom had received a premium the year before; and another of them the bounty of ten guineas. Among theſe, twenty-eight guineas were diſtributed, in the proportion of fifteen, eight, and five guineas. In 1765, though the premium was then diſcontinued, a perſon claimed it in conſequence of not being acquainted with that fact. Upon inſpection of the lace, it was found to have great merit: and the Society, therefore, gave another bounty of ten guineas.

It is to be feared, however, that theſe premiums and bounties have not had the propoſed effect. For, notwithſtanding it has been demonſtrated by the various claims, that there are not wanting either taſte or hands for making very beautiful point lace in England, yet the tedioufneſs of the work, and the ſmall price paid in proportion for the flowers, by thoſe who are to finiſh the point and carry it to market, ſeem inſurmountable impediments to the eſtabliſhing this manufacture in our country; where the great expenſiveneſs of living makes ſmall earnings ſo inconſiderable, as to be no inducements to induſtry. The not ſucceeding in the attempt to introduce the making point lace

lace here, is leſs to be regretted: as we have lately attained to perfection in making other fine lace; and eſtabliſhed a extenſive manufacture, more particularly of that kind called *Bruſſels*, in which great numbers are employed; and many thouſand pounds a year gained. The excellence to which this ſort of lace has been brought, has occaſioned it to ſuperſede in a conſiderable degree the uſe of point; and, conſequently, rendered the attaining that a leſs important object. The Society, however, purſued the right and probable means of doing the public a conſiderable ſervice, whether commercially or politically conſidered, in endeavouring to gain the manufacture of point.

There was another matter of the ſame kind, which the Society took under their encouragement. It was the KNITTING LACE. This ſort of lace has the appearance of that kind called *minionet*, admits of being wrought at a cheap rate, and is extremely durable. The ſame circumſtances of employing women not fit for labour, and conſequently, the ſame motives with relation to the Society, held good as to this, as in the caſe of point lace. But the knit lace could be much ſooner diſpatched, would afford greater profit to the manufacturer, and might be more eaſily diſpoſed of than point lace: and of courſe was much more likely to be practiſed by numbers.

The Society were firſt led, in the year 1764, to turn their attention to this matter, in conſequence of a ſpecimen produced to them, by a gentlewoman, who declared herſelf to be the inventor of the art of knitting lace: and as far as appears really was ſo. This ſpecimen ſhewed the practicability and excellence of the work. The Society gave the inventor

inventor a bounty of ten guineas; and advertiſed the following premium in 1764.

"For the greateſt quantity of thread lace, not leſs "than ſix yards in length, and two inches and an "half in width, knit with needles, and made by one "perſon; the goodneſs, clearneſs, and fineneſs of "the work, and beauty of the pattern, to determine "the preference; thirty guineas, to be divided "among the candidates according to their merit: "but no candidate to have more than ten guineas."

The next year, 1765, the advertiſement remained the ſame as in the preceding, except that the Society omitted the clauſe reſpecting the candidates being able to receive no more than ten guineas. In 1766 it was diſcontinued.

In 1765, the premium offered in 1764 was claimed by one candidate; to whom ten guineas was adjudged: and, in 1766, there were three candidates, among whom was the perſon who gained the premium in 1765: and who alſo obtained the largeſt proportion of the diviſion now. Twenty guineas, part of the premium of thirty guineas, was thus diſtributed among them: twelve guineas to one, and four guineas each, to the other two.

It appears by the claims, that this art was extending itſelf; and had made as much progreſs as could be expected from a matter ſo little known. It depended on the continuance of the Society's advertiſements to have eſtabliſhed it: and they were dropt rather from an accidental omiſſion, than a deliberate deſign. It is to be hoped, therefore, they will be renewed: and that the public will have the benefit, through their means, of the introduction of a manufacture ſuited to employ many women; who might be otherwiſe in diſtreſs, and led thence to immoral reſources.

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The Society extended their views to another article of this kind; which was, indeed, properly ſpeaking, a branch of the laſt: and in this they had the deſired ſucceſs.

On examination of the knit lace, it appeared, that the ſame work was applicable to the making WOMEN'S MITTS; and that the introduction of it for ſuch uſe would give an opening to a conſiderable manufacture. The Society, therefore, offered in 1764, the following premium. "For the "greateſt quantity of mitts, made of thread, in "imitation of lace, and knit with needles, fit for "women's wear; not leſs than one dozen pair; "each pair to be not leſs than fourteen inches in "length, made by one perſon; the goodneſs, clear-"neſs, and fineneſs of the work, and beauty of the "pattern to determine the preference; Twenty "guineas, to be divided amongſt the candidates in "proportion to their merit: and no candidate to be "intitled to more than five guineas." The next year the ſame advertiſement was offered to the public; except the leaving out that part, reſpecting the candidates being ſeparately intitled to no more than five guineas. In 1765, the premium for this article was diſcontinued.

This premium was never claimed. Moſt probably from the requiring a dozen pairs at leaſt to be produced: which might be more than any one perſon had diſpatched while they were ſo young in the art. But the advertiſements had, nevertheleſs, the deſired effect, with reſpect to the object. For there are conſiderable quantities of ſuch mitts and gloves now knit in different parts: and, as it is a matter that can be any where performed, the making it ſtill more known would be beneficial. It would, therefore, certainly be an expedient meaſure, if

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the premium for knitting lace be ever renewed, to join this to it.

The Society, among the other meaſures, they purſued for the encouragement of manufactures, by the improvement, or introduction of important machines, took upon them the encouragement of erecting a MILL, *or* ENGINE *for* GRINDING *and* POLISHING GLASS, MARBLE, *or* IRON PLATES. The manufactures, that depend on the uſe of ground glaſs, &c. are very conſiderable: and, in particular, optical glaſſes are becoming a very great article of exportation. It was known that this work had been well done in ſome places, by machines, that made great diſpatch: though there were none ſuch then erected near London. And, alſo, that thoſe mills or engines were capable of great improvement. In order, therefore, to procure, as well the introduction of the uſe of ſuch machines, as their improvement, the Society offered, in the year 1762, the following premiums.

"For the beſt effectual mill, or engine, to be "erected in London, or any where within twelve "miles of the Royal Exchange, to perform by "horſe, wind, or water, the grinding and po- "liſhing plate glaſs; or the brightening or other- "wiſe beneficially ornamenting or manufacturing "caſt or plate iron, for chimney pieces, jambs, "ſlabs, &c. or for ſawing and poliſhing marble; "which ſhall do, in the completeſt manner, the "greateſt quantity of work in the ſhorteſt time. "Seventy pounds.

"For the ſecond beſt, fifty pounds.

"And, for the third beſt, thirty pounds."

Each mill, or engine, was required by the Society to be completed and wrought during three months

months after the time, each candidate ſhould give notice that his engine was ready for trial.

In 1763, the advertiſement was the ſame. The next year it remained without any alteration: and, in 1765, the premium was diſcontinued.

In the year 1765 this premium was claimed and allowed for the conſtructing and working, during the term required, an excellent and curious machine of this kind. And the Society, deſirous further to promote the future erections of ſuch others, agreed to pay the candidate, over and above the premium, fifteen pounds for a complete model of the machine. This model was executed in ſo perfect a manner, that the Society thought fit to add five more; and gave the candidate twenty guineas. This model is in their repoſitory, for the aſſiſtance of thoſe, who may hereafter have occaſion to conſtruct ſuch a machine. And, in this inſtance, the Society have procured to the public the improvement, example of the uſe, and model of a machine, that may be of great conſequence to the manufactures of cut or ground glaſs, iron plates, or marble: and, which machine is alſo equally applicable to the cutting, grinding, and poliſhing agate, granate, porphyry, or other ſtones, on which ſuch operations uſually are practiſed.

The CLEANING *and* WHITENING FLAX *for making* BROWN OSNABURGS, was thought, likewiſe, an object proper for the Society's encouragement.

There are two kinds of coarſe linen called Oſnaburgs: the one white, and the other brown. The manufacture of the white, we are perfectly maſters of: and ſupply to our own trade. We ſhould equally

equally command the brown; but that a peculiarity in the colour is required: and the method of producing that colour was not then known to the manufacturers here. The demand for this ſort of linnen is very great. As it is the kind uſed by the negroes in the American colonies, to bind round their middle.

On a proper repreſentation of theſe facts to the Society, they thought fit to offer, in 1763, the following premiums for the diſcovery of the method of producing this brown colour in linnen: which was then thought, by perſons who had ſome pretenſions to judgment in this matter, to conſiſt in the management of the flax, previous to the ſpinning.

"To the perſon, who ſhall reveal to the Society, "the cheapeſt and moſt effectual method of cleanſing, or whitening the flax for making that kind "of Britiſh or Iriſh linnen, called brown Oſnaburgs, one hundred pounds." This premium was continued the two ſucceeding years: and in 1766 it was dropt.

In 1766 there was one candidate for this premium: to whom twenty-five pounds, part of it, were given, in conſequence of his having made an advance to what was propoſed: though with ſuch waſte in the flax, as rendered the method not applicable to the intended purpoſe, from this loſs of materials. This occaſioned an opinion, that the operation of bleaching, which produced the particular colour in the brown Oſnaburgs, was not performed on the flax, but on the yarn after it was ſpun, contrary to the information the Society received on this head when the premium was firſt offered. The advertiſements were therefore diſcontinued on that account. As it is a matter of

conſequence, as abovementioned, to our linnen manufactures, to gain the article of brown Oſnaburgs, it were to be wiſhed, nevertheleſs, that this matter ſhould be ſet in a clear light: and that the true method, practiſed in Germany, whether it be by a peculiar manner of bleaching the flax, or the yarn, ſhould be imparted to all thoſe, who are in proper circumſtances to undertake the making that kind of linnen.

The improvement of *Machines for Extracting Water out of* SHIPS, was another object of the Society's encouragement by premium. The conſtruction of pumps for common purpoſes had been carried to great perfection: and the chain pump, in larger veſſels at ſea, appeared to be the moſt fit, and efficacious, machine which had been produced. It was apprehended, nevertheleſs, that ſome other machine might be invented, which being accommodated to the motion, and other accidents attending ſhips, would, in particular circumſtances, if not in general, be more effectual than the chain pump.

Accordingly, the Society offered, in the year 1763, "to the perſon, who ſhould produce to "them, the beſt machine, or engine, for ex- "tracting water out of ſhips, to be eſſentially "ſuperior to any now known, or in uſe, as well "for the expedition of work, as for the ſaving "of the labour of men; and in which ſimplicity, "and cheapneſs would be conſidered as material "parts of its merits; one hundred pounds." In 1764, an alteration in the advertiſement took place. The Society then required proof, to be given to their ſatisfaction, of the ſuperiority of the pump, by actual experiment on board ſome ſhip in the river Thames. The next year and the year following

lowing the advertiſement continued the ſame: and in 1767 the premium was dropt.

During the time, theſe premiums were offered, ſeveral claims were made on the Society for them, but none were allowed till one in the year 1767, to which the premium was adjudged. This claimant having obtained the premium, the Society were thence determined to diſcontinue their offers reſpecting for this article.

There was another matter of a mixt nature, but moſt properly belonging to the claſs of mechanical improvements, which the Society have, by various means, endeavoured to promote. This is an attempt *to eſtabliſh the production of* SILK *in England.* It has been, till lately, a prevailing notion, that this matter was impracticable here in a commercial view: and that it was much better ſuited to ſome of our American colonies. Experience of the fact has ſince ſhewn, that it is attended with greater difficulties in our colonies, according to their preſent ſtate, than was imagined before the trial. And there is reaſon to hope, that other facts will evince, the ſame difficulties do not ſubſiſt here. If the many former miſcarriages be urged, as an argument againſt this opinion; it may be anſwered, that theſe attempts were not adequate trials: but eſſays, by perſons wholly ignorant of the means of ſucceſs. For with the aukward improper manner of managing the worms; and ſtill more of winding the ſilk from the cocoons; it was next to impoſſible to produce that commodity perfect. The Society, however, adopted very reaſonably the opinion of the time, at their firſt inſtitution; and, deeming the matter impracticable here, turned their views to the encouragement of ſilk in America: with regard to which

we ſhall below ſee the particulars of their proceedings, and the reſult. But, in 1766, a gentleman ſent a ſpecimen of raw ſilk to the Society for their examination: and on the conſideration of it, there was no room to doubt, but with a little more judicious management, it would have been perfectly good In the deliberations on this ſpecimen, it appeared, from unqueſtionable authority, that the art, as well of managing the worms, as winding off the ſilk from the cocoons, was now well known here to particulars: that very fine ſilk had been produced, even in quantities not inconſiderable, by ſome few; and that all the ſuppoſed grounds of the impracticability of producing ſilk in England, were erroneous opinions. The Society, therefore, preſented this gentleman with a ſet of the apparatus for winding ſilk: both as an aid to his deſign; and a mark of their approbation and encouragement to proceed. They, alſo, inſtituted premiums for the planting mulberry trees for feeding ſilk-worms; and for the ſilk to be obtained from the worms. But as theſe ſtand in the preſent liſt of premiums, they will come more properly in queſtion in another place; where a demonſtration of the peculiar public utility of the introduction of this article, and a particular anſwer to the reaſons brought againſt the probability of ſucceſs in the attempts, will be given. In the mean time, a diſcuſſion of theſe points may be found in two letters, ſigned *Agricola*, which I publiſhed in the *Muſeum Ruſticum*, Vol. VI. p. 241,—304. in order to ſupport the Society's views in this matter, when they firſt adopted the object.

The *making* ARTIFICIAL FLOWERS *in England*, was one of the lateſt articles in this diviſion, which the Society have tried to encourage. It may appear,

pear, at firſt ſight, a matter of little moment: but it is far otherwiſe. We pay to Italy and France, for various kinds of ſuch flowers, for bouquets, trimmings, &c. a ſum, that would appear almoſt incredible to thoſe, who are not well informed of the particulars, both of the quantity, and very high price of the finer ſort. At the ſame time, we have great numbers of women unemployed, who, with a moderate application, would eaſily attain to the art. The floſs ſilk, as it is called, which is the material for the principal kind, is not to be eaſily had here: but there are various other ſubſtances, obtainable in any quantity, that would anſwer the purpoſe equally well. The Society, therefore, had very ſufficient motives for endeavouring to promote this art here: and in 1767 they offered the following premiums:

"For ſpecimens of artificial flowers, made in "England, to the beſt, twenty guineas; and "thirty guineas to be divided among any other "candidates, according to their merits."

There were only two candidates for theſe premiums; to one of whom two guineas were given; the performance having little merit. It is much to be regretted that more have not applied themſelves to this art: the knowledge of which, as to the mechanical part, lies in a ſmall compaſs: and the taſte, or rather fancy of the mode, on which the value of the flowers principally depends, might be eaſily acquired by inſpection and imitation of the foreign. In order to facilitate this, the publication of inſtructions for chuſing, preparing, colouring, and managing the materials, would be a proper previous ſtep: as the want of this knowledge is the only means of accounting for the ſupineneſs of great numbers of women, who labour under dif-

ficulties in their circumſtances, from trying to get, not only an eaſy, but even a genteel ſupport, if they attained to any degree of perfection in this art.

The Society, alſo, offered premiums for ſome other matters, that properly come under the claſs of improvements of mechanical arts, for which claims were never made. But, as the inefficacy of them was the reſult of accidental impediments, rather than any impracticability or unfitneſs in the nature of the object, it may not be improper to touch on them: as the keeping alive the remembrance, or propagating the knowledge of them, may occaſion their being hereafter purſued with ſucceſs.

One of theſe matters was, the making CLOTH of the STALKS of HOP BINDS. It is well known, that in Sweden, and other parts of the North, they are applied to this uſe: though we wholly neglect them. It appeared, therefore, to be a means of ſaving part of the money ſent abroad for hemp or flax; as well as rendering this branch of clothing cheaper to the common people.

The Society therefore publiſhed, in 1760, the following advertiſement of a premium:

"A ſtrong cloth being prepared in Sweden, "from hop ſtalks or binds, the Society will give "a premium of fifty pounds for the beſt and greateſt quantity of ſuch cloth, not leſs than one "hundred and twenty-five ells, made in England; and produced to the Society in December "1761: and

"For the ſecond beſt and greateſt quantity, "twenty-five pounds."

The following direction, for the management of

of the hop binds, was ſubjoined to the advertiſement.

" The hop ſtalks or binds are to be collected in " Autumn, put into water, and covered therewith the whole winter. In March they are to " be taken out, dried in a ſtove, and dreſſed as " flax. The prepared filaments will be fine, ſoft, and " white, and may be ſpun and woven into cloth.

" Hop ſtalks require a longer time to rot than " flax; and if not compleatly macerated, the woody " part will not ſeparate, nor the cloth prove white " or fine."

The next year the advertiſement was continued the ſame. But in 1762 it was altered.

The Society then propoſed " to give to the " perſon who ſhould make and produce the beſt " cloth, not leſs than twenty ells, made from the " fibres of hop binds, thirty pounds.

" For the ſecond beſt, not leſs than fifteen ells, " twenty pounds.

" And for the third beſt, not leſs than ten " ells, ten pounds.

" The cloth to be at leaſt a yard wide."

The following additional direction was likewiſe inſerted in the advertiſement.

" It not being exactly known, how long time " hop binds require to be ſteeped in water, in or- " der to ſeparate the fibrous parts from the reſt, it " is recommended to the candidates for theſe pre- " miums, to examine the hop binds, from time " to time, during their ſteeping in the water; and " to take them out before the fibres appear to be " weakened too much for the uſe intended."

The Society, alſo, this year, in order more effectually to compaſs their deſign of eſtabliſhing a manufacture of this kind of cloth in England, pro-

poſed a premium of fifteen pounds, in the following manner, for yarn made of the fibres of hop binds. "For the beſt yarn made of the fibres of "hop binds, not leſs than twenty pounds weight, "ten pounds: for the next beſt, the ſame quan"tity, five pounds."

Theſe premiums were again offered in 1763: but in 1764 they were diſcontinued.

Theſe premiums did not, however, produce any claims. But it is known that ſeveral attempts were made. The miſcarriages in them, were not owing, nevertheleſs, to any impracticability in the nature of the thing: becauſe it is done commonly and extenſively in Sweden: but merely to the want of more exact knowledge of the time of rotting the hop binds, in order to the making them undergo well the breaking and dreſſing. It were to be wiſhed, therefore, that the advertiſements had been longer continued, and the premium offered for a ſucceſsful experiment only, and not great quantities. For further trials, or more minute information of the practice in Sweden, muſt of courſe have removed the difficulty: and rendered the hop binds, the quantity of which is very conſiderable, an uſeful article of produce, though they are now wholly waſted.

It may not be improper to mention here, that *nettle ſtalks* are treated in Sweden, in the ſame manner as hop binds: and cloth made of them.

There are many other plants, having ſtrong fibres, which run longitudinally in the ſtalks or leaves, that are capable, by rotting and dreſſing, of anſwering the end of hemp, or flax. Such plants are not produced in England, in great quantities: as ground which is diſpoſed to produce them, being fertile, is in general cleared of them by

culture. But in the different countries where we have eſtabliſhed colonies, they are found in ſufficient quantities. The leaves of ſome ſpecies of the *aloe* and *anana*, or *pine apple* tribes, have been treated in this manner; and produce various kinds of that fibrous ſubſtance, called ſilk graſs: of which we ſhall take more particular notice below. The *apocynum*, and *aſclapias* tribes, as well the creeping as the erect, are, alſo, peculiarly adapted to this purpoſe: and in New England, a kind of the *apocynum*, found wild in conſiderable quantities, has been treated in the manner of flax; and affords what may well paſs for middling good: as appears by a ſample ſent ſome time ago to the Society, along with ſpecimens of the plant, under the name of *New England flax*. A proper attention to this uſe of plants, in ſome of the infant eſtabliſhments, may be very beneficial, where there is no opportunity of cultivating hemp, or flax.

Among the plants, which promiſe moſt to be ſerviceable in this light; and may be obtained in the greateſt plenty, in many parts both of Aſia and America; the FRUIT-BEARING PLANTAIN appears to claim the firſt place. The ſtem, when rotted, broken, and dreſt as hemp or flax, affords coats of fibres of different qualities, that will anſwer for a great number of purpoſes, according to the ſtrength or fineneſs required. The plantain ſtem is, alſo, much more eaſily manageable, as to the freeing the fibrous from the pulpous part, and preparing it for the ſpinning, than hop binds, nettles, or even hemp and flax themſelves. It would, therefore, be of great utility to apply that plant to the ſeveral purpoſes of this kind, to which it is naturally ſuited: as there are great numbers of plantains raiſed for the ſake of the fruit; of which

which the ſtems are at preſent conſtantly thrown away as uſeleſs. Theſe reaſons induced the Society to attempt the introduction of the manufacture of the fibrous part of the plantain. A quantity of the plantain ſtems being produced, in 1762, to the Society, in various ſtates, to ſhew the nature and qualities of the fibres, the Society procured ſome of each kind to be manufactured into thoſe articles, to which they ſeemed beſt adapted. Being convinced, by the inſpection of theſe ſpecimens, of the practicability of the reſpective application, and the perfection of the articles produced, they publiſhed the following advertiſement of premiums: a member of the Society, who had concerns in the Weſt Indies, engaging at the ſame time, to ſend for a conſiderable quantity of the plantain ſtems, in order to furniſh any manufacturer with them, who ſhould be willing to make trial of them for any of the uſes propoſed.

"Whereas the ſtem of the Aſiatic and American *fruit-bearing Plantain*, affords three ſorts of fibrous materials: that reſemble hemp, hard ſilk, and cotton: all which have been experimentally found capable of being worked into various ſorts of manufactures; and, among others, into cordage, fuſtian, lawn, knitting, gawze, blond lace, and excellent candlewicks: ſundry ſpecimens of which manufactures, may be ſeen in the hands of the Regiſter of the Society:

"It is, therefore, propoſed to give a premium of thirty pounds, to the perſon, or perſons, who ſhall, on or before the firſt Tueſday in January 1764, produce to the Society, the largeſt quantity, and greateſt variety, of the beſt and moſt merchantable commodities, manufactured from

"the

" the coarſer part of the ſaid fibrous material, re-
" ſembling hemp.

" And, alſo, a premium of ſixty pounds, to
" the perſon, or perſons, who ſhall, on or before
" the ſaid time, produce to the Society, the largeſt
" quantity, and greateſt variety, of the beſt and
" moſt merchantable commodities, manufactured
" from the ſecond ſort of the ſaid fibrous material,
" reſembling hard ſilk.

" And, alſo, a premium of forty pounds, to the
" perſon, or perſons, who ſhall, on or before the
" ſaid time, produce to the Society, the largeſt
" quantity, and greateſt variety, of the beſt and
" moſt merchantable commodities, manufactured
" from the third ſort of the ſaid fibrous material,
" reſembling cotton.

" Alſo, a premium of eighty pounds to the
" perſon, or perſons, who ſhall, on or before the
" ſaid time, produce to the Society, the largeſt
" quantity, and greateſt variety, of the beſt and
" moſt merchantable commodities, manufactured
" from the aforeſaid materials, by a mixture of
" two, or all of the beforementioned ſorts, either
" with one another, or with other materials."

Theſe premiums were continued to be offered for two years after this: and in 1763 they were dropt.

Theſe premiums were never claimed, from a very clear reaſon: which was, that the quantity of plantain ſtems, ſent for by the abovementioned gentleman, miſcarried: whence the manufacturers, not being able to procure the materials, could not poſſibly make any attempt. It is, however, to be regretted, that ſo promiſing a deſign was ſo ſoon given up. For, though it is not likely, that, till the materials are more within their reach, this matter

ter ſhould ſtrike the manufacturers, ſo as to ſet them to work to gain the Society's premiums; yet it ſeems in the power of the Society to go a ſtep further; and procure the importation of the materials, in a ſtate fit for each of the reſpective kinds of manufactures. This ſhould not be done, by encouraging the bringing over the crude plantain ſtem, but the fibrous part, ſeparated after proper maceration: which will be certain of meeting with purchaſers; who will readily apply it to the proper manufactures; if they can obtain it at a price that may yield them profit. By this means, not only a great part of the freight of the materials will be ſaved; but the danger of loſing the whole, by ſuch a putrefaction, as would periſh the fibrous part, as well as the pulp, will be avoided. This method of proceeding appears the more neceſſary, ſince the quantity, promiſed, as abovementioned, to be procured for the Society, was deſtroyed by ſuch means, in the bringing over, from its not being then attended to, that quantities of the plantain ſtem, when put together, in a cloſe place, would putrify. The difficulty of bringing over the crude ſtems without injury to them, as well as their unneceſſary bulk and weight, compared with thoſe of the ſeparated fibrous part, renders the conveying them to Great Britain, in that ſtate, as improper as impracticable. But this very pronenes to putrify, which makes the plantain ſtems unfit for carriage, is an advantage in the rotting, or proceſs for ſeparating the fibres from the pulp, which this plant has over hemp, flax, hop binds, &c. and therefore a favourable quality, where the matter is not to be previouſly conveyed to great diſtances, in large quantities.

If, therefore, the Society, by rewards, and pro-

per inſtruction, could procure the ſeveral kinds of the fibrous part of the plantain ſtems, as materials ready prepared; that is to ſay, to be ſent over in the ſame ſtate as hemp or flax; ſuch materials would find a ready ſale, at a price profitable to thoſe who are to manufacture them: and this would induce the proper perſons to undertake ſuch manufactures, as might be pointed out to them, in advertiſements for ſmall premiums for their ſo doing. By theſe means, the Society might complete their views, with reſpect to this object; and procure ſeveral very conſiderable improvements in ſome of our articles of manufacture, by the uſe of a better or cheaper material for each reſpective purpoſe. While, at the ſame time, a correſpondent proportionable return would be made to the colonies for the materials; with the excluſion of foreign commodities, which are now employed.

It is in articles of this kind, where want of knowledge and information, in thoſe who are ſituate to undertake them with advantage, prevents the introduction of uſeful matters, that the Society can be, and indeed has been in various inſtances, of the greateſt public utility.

The rendering more common the art of *making* WATCH FUSEE-CHAINS, was made an object of the Society's premiums. This article was got into foreign hands; though there is not the leaſt reaſon why we ſhould not ſupply ourſelves, if numbers were to engage in it; and render their work cheap It is the more deſirable we ſhould have this manufacture, becauſe it may be carried on, moſt properly, by the hands of women. The Society, therefore, endeavoured to procure the teaching of this art, by the following premium, in 1763.

"To the perſon, who ſhall have inſtructed, in

"in

" in the beſt manner, in any one manufactory,
" the greateſt number of women or girls, not
" leſs than ſix, in making watch fuſee chains,
" thirty pounds.

" N. B. Certificates are to be produced, that
" the ſeveral perſons, ſo taught, do actually gain
" their livelihood by making ſuch fuſee chains,
" at the time of the claim."

This premium was again offered the next year. In 1767, the Society augmented it to forty pounds; and only required four perſons to be inſtructed: which was alſo propoſed to be gained in 1768.

This premium was never claimed: and, indeed, the ſum offered, ſeems ſcarcely ſufficient to induce any perſon to ſet about a matter, that muſt, of courſe, be attended with ſo much trouble: as the collecting together a number of women, or girls, who will apply properly to this matter: and, then, teaching them; and finding them work for practice while they are learning. The object itſelf is, however, deſirable, as well as probably attainable; and worthy the regard of the Society.

The procuring the eſtabliſhment of *the manufacture of* MILLED CAPS *in England*, is one of the later objects of the Society's premiums. This is a matter of very high importance. The French carry on two branches of very great trade, for theſe caps. The one to the Levant: the other to Canada. They are uſed by the Aſiatics, under their turbants; and by the Canadians, for their warmth, as night caps. They are made at Orleans, and ſome other places; and afford a very large return. It is ſaid, on very good authority, that Canada alone, takes off to the amount of between twenty and thirty thouſand pounds annually. As this coun-

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try is now a part of the Britiſh dominions, there is no reaſon why we ſhould not ſupply theſe caps from our own manufactures. But, being a matter very little known, it became a very proper concern of the Society's attention. As by the publication of premiums for it; and furniſhing ſpecimens, without which it could not be attempted here, they give a fair opportunity to all, who are in proper circumſtances, to undertake this manufacture. In purſuance of this view, in 1767, they publiſhed the following advertiſement.

" For the beſt ſpecimens of milled caps, manu-
" factured in England, like thoſe manufactured at
" Orleans, the ſamples of which are not to be leſs
" than ſix dozen, viz. two of caſtor, two of Se-
" govia wool, and two of Engliſh wool, to be
" determined in proportion to their merits, thirty
" guineas.

" Specimens of the proper ſorts will be left at
" the Society's office, for the inſpection of ſuch
" as are willing to be candidates." This premium was again offered in 1768.

This premium has not been claimed: and indeed it may be accounted for. A diſappointment having deprived the Society of the ſpecimens that were to have been procured from France, in 1767, according to the advertiſement: without which it was impracticable for the manufacturers to attempt the performance. But this difficulty is removed; and the Society are in poſſeſſion of a complete ſet of the various ſorts; by which any perſon may be fully informed of the qualities and faſhion.

The Society, likewiſe, gave an encouragement by their ſanction or bounties, to ſeveral articles reſpecting the improvement of the mechanic arts, for which they did not advertiſe any premium

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The CRANE, being a capital machine, and of the greateſt uſe in commerce, and for other oeconomical purpoſes, ſeveral new conſtructions have been offered to the Society as improvements by the reſpective inventors. Of theſe the Society rewarded ſeveral by bounties.

In the year 1761, they gave a bounty of twenty guineas, for a new kind of crane, to be wrought by the hand; in which an application had been made of the endleſs ſcrew. In 1762, they gave another bounty of fifty guineas to a very ingenious teacher of mechanics, for an improved conſtruction and model of the wheel-crane: and, in 1766, another bounty of ten guineas, for a different improvement, and model of the ſame kind of machine. In 1767, they, alſo, gave a gold medal for a very ingenious device, to prevent the miſchief that frequently happens from the acceleration of the velocity in letting down great weights, by the wheel crane: which has produced many fatal accidents to the labourers. This miſchief may be effectually prevented by that device, through a proper apparatus to check the motion of the wheel, whenever it gains a greater velocity than is deſired. The apparatus is made to act, in ſuch caſe, by means of a pair of bellows, wrought whenever the crane is at work, by the motion of the wheel. The pipe of theſe bellows is made of ſuch bore, as to diſcharge the air freely, when the motion of the wheel is of the due degree. But when it gains too great velocity, the interior ſurface of the bellows, being ſtrongly acted on by the compreſt air, which does not then find an adequate vent through the pipe, a part is put in motion, that communicates with the apparatus for ſtopping the wheel; and immediately throws it in-

to

to the ſituation in which it performs ſuch office. This contrivance is not leſs effectual than ingenious. A model was firſt produced to the Society: but, to ſet the matter unqueſtionably clear, and to induce more readily thoſe, who uſe wheel cranes, to put in practice this method, the Society determined, at their expence, to have a trial of it made at large, by adding the machinery to a real crane: which was accordingly done. The event proved perfectly ſatisfactory: and the inventor was deemed to deſerve well the honour done him by the Society. It does not appear, that this invention has been ſince applied in practice any where: which can only be imputed to the inattention paid to a matter, that would produce ſecurity to the workmen, but no profit to the proprietor of the crane. The Society have, however, done what is due from humanity, in demonſtrating, that there is a practicable and certain method of preventing the deſtruction of a number of men: and it were to be wiſhed, the legiſlature compelled thoſe, who ought, to carry it into execution.

The Society gave, in 1762, thirty guineas to a perſon who had invented *a machine for* PLANEING CAST IRON. The conſtruction of this machine was very ingenious; and its operation extraordinary. It planed large iron plates as effectually as a common plane does boards; making curled ſhavings, and completely ſmoothing the ſurface of the plates. This operation is applicable to ſeveral material purpoſes, to ſave the more tedious one of grinding, in order to obtain a level ſmooth ſurface on large iron or copper-plates: particularly for calendars for ſilk and linnen: or for copper-plates for printing linnen, &c.

The Society, alſo, in 1762, gave a bounty, of forty

pounds, for *an improvement in the* SILK REEL. This juſt conſtruction of this inſtrument, ſo neceſſary to the eſtabliſhment of the production of ſilk, either in Great Britain, or the colonies, was not then well underſtood here: and the inventor made a very ingenious application of the endleſs ſcrew, to remedy the principal defect found in other ſilk reels, which was that of the adheſion of the filaments, by their coming in contact with each other where they ſhould not. This is called *vitrifying*; and was propoſed to be effectually provided againſt by the operation of this machine. The efficacy of it, however, in this light, has been diſallowed by very good judges: at leaſt in the mode it was produced to the Society. It has been ſaid to have been improved ſince; and rendered more perfect. But the Society have procured a reel, with the baſon, furnace, and all the apparatus proper for reeling ſilk, of the conſtruction of thoſe employed in Piedmont: which are allowed to be the moſt excellent of any in uſe. Theſe are in their repoſitory, as a model for the uſe of any, who may have occaſion to provide ſuch an apparatus.

The Society, alſo, gave encouragement to an improved conſtruction of PAPIN'S DIGESTOR. This machine is not only of conſequence in experimental philoſophy; but applicable to various commercial purpoſes. The improvements of it, in a draught produced to the Society, in 1762, appeared very conſiderable, and momentous: rendering the machine much leſs dangerous, and far more commodious in its uſe; as well as much more accurate, and powerful in its operation. The Society, therefore, had a digeſtor made according to this conſtruction; and, having tried it, gave the inventor a bounty of thirty guineas: retaining the

machine in their repoſitory, to ſerve as a model for the making any, that may be deſired; and to this purpoſe it has accordingly been applied.

The Society, in the year 1763, gave encouragement to the inventor of a furnace, to anſwer the end of a COMB-POT, *for the uſe of wool-combers*. Every improvement in our woolen manufactures ought to be cheriſhed: and this was a very material one, both with reſpect to the better diſpatch of buſineſs, and the preſervation of the people employed. The uſe of the comb-pot is to heat the irons in wool-combing: which was before done in an open charcoal fire made in the pot. This was attended with great injury to the health of the people, by the fumes of the charcoal fire; as well as ſeveral other inconveniences, and an unneceſſary expence in charcoal.

The improvement, for which the Society gave this bounty, was the ſubſtituting a ſmall furnace, wherein pit-coal might be burnt. This furnace had a chamber over the fire-place, that admitted of being made hot to the due degree: in which as many irons, as could be required, might be heated to an exact point. By that means, both the deſtructive fumes of charcoal, and the expence attending the uſe of it, were avoided: and a more certain and commodious method of heating the iron afforded: by which, moreover, they were kept from being ſmoaked, or ſoiled in the heating; or deſtroyed by the fire in a ſhort time, as they were liable to be, when expoſed to the naked action of the burning coals. The Society being ſatisfied by the examination of the model, and the teſtimony of perſons, who had actually uſed this kind of furnace at Ipſwich; gave the inventor a bounty of thirty guineas, to lay the invention open to the public; and leave

the model with them, for the aid of ſuch, as might be deſirous to carry this improvement into practice.

The application, which the Society had excited, by their premiums for marbled paper, to improve the ornamenting paper by that and ſimilar methods, occaſioned the carrying to great perfection the art of EMBOSSING PAPER, with a variety of colours, mixt with gilding. The improver of this art, having attained to a very great excellence, produced in 1764, to the Society, ſome very beautiful ſpecimens of ſuch emboſſed paper, ſuperior to any thing of that kind imported from abroad; and gave them, alſo, ſatisfactory aſſurances, that he could afford it at a cheap price: and was very deſirous, under their encouragement and ſanction, to eſtabliſh a manufacture of ſuch paper.

The Society, accordingly, conſidering this, as the purſuit of one branch of a capital article of their views, gave the improver of it a bounty of fifty guineas, to aſſiſt him in eſtabliſhing a manufactory: which he, conformably to his engagements, did with great ſucceſs. The acquiſition of this valuable and beautiful manufacture ought, therefore, to be aſcribed to the Society; who, originally, ſet on foot the trials and experiments, to rival foreigners in marbled and other ornamental paper; and, afterwards, enabled the ingenious improver of this branch to carry his invention effectually into practice.

The invention of a method of *making* IRONS *in England, for drawing gold, ſilver, and braſs wire*, met, alſo, with encouragement from the Society. Irons of this kind were before had from abroad. They were very dear: and it was ſo difficult

difficult to obtain ſuch as were perfectly good, that many artizans, who had occaſion to draw wire, were very much at a loſs to procure them. In 1765, ſpecimens were produced to the Society, of ſuch irons made in England; which appeared to be good: and they gave the inventor a bounty of ten guineas.

The Society, alſo, gave bounties to the following mechanical improvements and inventions, of which the particular conſtruction and merits may be more properly explained in another place below: viz. *Improvement* of the cyder-mill and preſs; of the copper-plate printing preſs;—of wheel-carriages in ſeveral ways;—of the inſtruments for gaugeing veſſels;—of the compaſs, and protractor; of hanging gates and doors;—of the land quadrant. *Invention* of a machine for boring augre-holes;—of a machine for raiſing water by wind;—of a perambulator, or machine for meaſuring land;—of machinery for ſaving men and goods, in veſſels caſt away at ſea.

On this review of the proceedings, with reſpect to improvement in the mechanical arts, or the trades dependant on them; and the reſult of ſuch proceedings; it muſt be allowed, that the public are greatly indebted to the Society. If we conſider ſolely what is already obtained, they appear to have ſucceeded greatly beyond what could be expected from a voluntary coalition of private perſons, unaided by government, either with reſpect to pecuniary ſupport, or peculiar privileges. But they have, moreover, laid the foundation of many future improvements, by that ſpirit of application to mechanical purſuits which they have generally diffuſed; by the attention they have raiſed to particular important objects; and by their collection

of models and machines, which will be a conſtant ſource of hints and means for future inventions of a new kind; or for the completing thoſe, where at preſent only a leſs advance is made towards perfection.

SECT. V.

Of Improvements in the Chemical Arts.

THE endeavours of the Society to advance the arts which depend on CHEMICAL PRINCIPLES, are from their nature more confined than thoſe which depend on the mechanical. But it will be found, on examination, that the Society have not been more remiſs in this province, than in the others: and that their ſucceſs has not been leſs in proportion. There are, perhaps, fewer inſtances where the premiums of this claſs have been obtained. But the great end of procuring commercial advantages to the Britiſh community has been equally well anſwered, by the collateral means of bounties, or purchaſes of valuable ſecrets for the public uſe. In the inveſtigation of the Society's meaſures, and their conſequences, with reſpect to the articles of this claſs, I ſhall adhere to the ſame diviſion, as in the preceding; into thoſe matters where premiums have been offered and obtained; thoſe where they have been offered and not obtained; and thoſe where the Society have taken upon them to promote or encourage by bounties or purchaſes, though no particular rewards have been particularly advertiſed, or inſtituted for them.

The *diſcovery of a mine of* COBALT, that would afford ſuch quantity as might be wanted for the ſupplying

ſupplying ourſelves with zaffre and ſmalt, of our own making, was one of the firſt objects relating to chemical arts, which the Society adopted. Zaffre is extracted from cobalt; and is the matter uſed for colouring ſmalt; which is in fact only the powder of a glaſs highly tinged with blue, by means of it; and it is alſo uſed as the tinge for other glaſs and common blue enamels. It appeared, on examination of the cuſtom-houſe books, that in the year 1753, we imported 207,510 pounds weight of ſmalt. The Society were informed, alſo, that there had been a manufacture of it in England; which had been ſupplied with cobalt from a mine near Truro in Cornwall: but that this mine was exhauſted; and no other known in Great Britain that could ſupply its place.

From theſe circumſtances, the Society were induced to adverti ſe a premium in the following manner in 1754. "Cobalt having been already "diſcovered in ſome parts of this kingdom: For "producing ſpecimens, not leſs than twenty "pounds, the beſt in quality, thirty pounds."

In 1765, there was a claim made from Cornwall for this premium. The Society were then convinced, as well from ſuch claim, as from ſome further information they had received with reſpect to this matter, that cobalt was to be obtained in conſiderable quantities, in many parts of England: and, therefore, they endeavoured to eſtabliſh, by their premiums, manufactures for making zaffre and ſmalt from ſuch cobalt as might be procured here. With this intent, they ceaſed the premium for the producing cobalt; and ſubſtituted, in its room, the following. "For making the moſt, and "beſt zaffre, not leſs than five pounds weight; "and ſmalt, not leſs than fifteen pounds weight,

"from Engliſh cobalt, thirty pounds." They likewiſe adverti ſed, that ſuch perſons as had the intention of ſetting about a work of this nature, might have, by applying to their Regiſter, ten pounds of Engliſh cobalt given them. However, it does not appear, that even this had the deſired effect. For they continued to offer premiums for theſe articles till the year 1761, without their having been ever obtained. In 1762, the Society, ſtill deſirous to eſtabliſh a manufacture of this article, which they had ſo long attempted with ſo little ſucceſs, augmented their premium to fifty pounds. This they, alſo, offered the year following: and, in 1764, there was a claim for it; which was allowed. The Society, the ſame year, and likewiſe in 1765, propoſed one hundred pounds, as a premium for the making zaffre and ſmalt from cobalt. But in the year 1766, they diſcontinued it. During the offering theſe premiums, the Society ſtrove, by every means in their power, to promote the eſtabliſhment of manufactures of zaffre and ſmalt. In 1756, they propoſed to give a gold medal to the perſon, who ſhould compoſe, or write a treatiſe on cobalt: in which, a minute deſcription of this ore; where and how it is to be found; in what manner it is to be tried properly; and the beſt method of making zaffre and ſmalt from it; were particularly to be attended to. This premium was claimed by a number of perſons, as well foreigners as our own countrymen: but it does not appear the gold medal was granted. The Society were, likewiſe, at the expence of tranſlating ſome books on this ſubject; but accident delayed the publication: and information, that the manner of making zaffre and ſmalt was then known to many in England, prevented its being ever done.

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The endeavours of the Society have not, hitherto, proved ſucceſsful, in the diſcovery of a mine, that may ſupply cobalt for the making the zaffre and ſmalt, we conſume. But, during the time of their proceedings on this matter, a very conſiderable manufacture of ſmalt was eſtabliſhed; and carried on by means of cobalt brought from the Empreſs queen's dominions; and imported hither from Trieſte.

It is ſcarcely to be queſtioned, but that, in the variety of mines, the large tracts of mountains, we have in Great Britain, afford, there muſt be veins of cobalt, that would anſwer the views of the Society. But, though it is very uſual to find cobalt in bunches, interſperſed among other minerals, yet it is very rare to find ſuch a load as will ſupply a manufacture of zaffre and ſmalt. Germany alone has hitherto furniſhed this mineral in perfection: and not only the proprietors of the mines of it, and of the works of zaffre and ſmalt, but the princes themſelves have drawn very great advantages from ſupplying, almoſt the whole of thoſe commodities, which has been uſed in Europe. We might undoubtedly rival them, by the diſcovery of equally good mines. But this muſt depend on the chance of what may be found in the reſearch after other minerals, or the operations in the reſpective mines. For it will ſcarcely anſwer, to open mines, with a view to cobalt alone. The making known the utility, and proſpect of advantage of it, to thoſe, who are concerned in other mines, was all the Society could propoſe to do by the advertiſements of their premiums: and that being effected already, they have very properly diſcontinued them.

The *making* BUFF-LEATHER *in England*, was another of the firſt articles, that came under this claſs,

claſs, which the Society took under their encouragement. We were furniſhed with that kind of leather, or loſh as it is called, for the uſe of our army, from Holland: and the Society were informed, that the ſame kind could be produced from ox hides dreſt in oil; and, conſequently, manufactured here. They, therefore, in the year 1755, propoſed this premium. "For the beſt "five hides dreſſed in oil, to anſwer the purpoſe "of that uſually called loſh, or buff-leather, fit "for the uſe of the army, ten pounds."

The next year the premium was diſcontinued.

In conſequence of this advertiſement, there were two claims: to one of which the premium was allowed.

The ſpecimens produced, appeared on examination, by thoſe who were eſteemed the beſt judges of this leather, to be perfectly good, and fit for the propoſed purpoſe. And the Kentiſh militia, and ſome other corps, had their accoutrements made of it. So that the Society undoubtedly carried their point, of ſhewing that this kind of leather could be manufactured here, as well as abroad; and with profit to the undertaker, provided they could have the orders for ſerving it where it is demanded. Why the whole has not been ſince ſupplied from our manufacture, does not appear. But moſt probably it has ariſen from the manufacturers not keeping up their credit, by making it ſo good as the foreign: or as that for which the Society gave the premiums.

The TINNING COPPER *and* BRASS VESSELS, *of a large ſize, in a perfect manner*, was, likewiſe, one of the firſt matters, the Society took on them to encourage by the offer of premiums. In a commercial light, this was not of great conſequence. But as the

the health and lives of numbers of perſons depend on the avoiding untinned veſſels of copper or braſs, or ſuch as are imperfectly tinned, it may be well conſidered as very momentous. Inſtead of the original, and proper method of tinning copper with pure tin, a cheap and ineffectual one prevailed in uſe: by which, the tin, being adulterated with lead, and not being well ſoldered and made to combine with the copper, but only to adhere in a ſlight manner to it, is ſoon worn off; and the ſurface of the copper expoſed to be corroded by many ſubſtances heated in the veſſels. This produces a poiſonous matter, that not only does ſlow miſchief to the health of perſons, who eat victuals dreſt in ſuch veſſels, but has occaſioned the quick death of many, with the moſt violent and painful ſymptoms. The Society, therefore, as well to apprize the public of this miſchief, that more general caution may be uſed, as to induce the artizans to tin in the genuine manner, publiſhed, in 1755, the following advertiſement.

"Whereas large veſſels have not been tinned "in England: and a bad practice, of tinning "ſmall veſſels has prevailed; by mixing lead "with the tin: and as it is unwholeſome to "make uſe of any copper, or braſs veſſel which is "not tinned: therefore, the Society propoſe to "give ten pounds for tinning, in the beſt work-"manlike manner, the largeſt veſſel, containing "not leſs than thirty gallons, with pure common "tin; upon affidavit, to be made by the claimant, "that it is done with pure common tin, without "lead, or any other alloy whatever." For this premium there were four candidates; to one of whom it was adjudged. Theſe claims appear to be the firſt attempt to tin large veſſels in England: though

though it is common in other countries. It might have been hoped this intimation to the public of the expedience of it, and the demonſtration of the practicability, would have introduced the practice here.

The Society's meaſures had, however, a very good effect; with relation to ſuch veſſels as are uſually tinned; though the faulty method of performing it is not yet intirely corrected. For many perſons are induced to be cautious; and ſome artizans at all times, and others when particularly required, do tin in a better manner than before. The reſt will, it is hoped, as the knowledge of the danger of neglecting it is continually becoming more general, be at laſt obliged, for the ſake of their reputation, and cuſtom, to leave off the miſchievous abuſes practiſed in this point.

The *making* CRUCIBLES, *like the* HESSIAN, *in England*, was a third article of the Society's encouragement. Theſe crucibles were all imported from abroad. Though, from the variety of earths and clays, and the perfection we were arrived at in the fabrication of earthen veſſels, there was the greateſt reaſon to believe, they might be made in a perfect manner here: and the money paid for them conſequently ſaved to the public.

The Society, therefore, in 1756, declared their intention to promote the introduction of this article, by the following advertiſement. "To the per-"ſon, who ſhall make a neſt of the largeſt and "beſt crucibles, of Britiſh materials, and equal "to the crucibles imported for melting metals and "ſalts; to be produced to the Society; twenty "pounds." The next year the premium was augmented to thirty pounds. It was continued in 1758; but in 1759 an alteration took place in the adver-

advertiſement, in which the Society declared, that there had been produced to them, in conſequence of their premium of the preceding year, crucibles, made of Engliſh materials, equal in goodneſs to the foreign. Therefore, in order to eſtabliſh a manufacture of ſuch crucibles in England, they propoſed, "to give thirty pounds to the perſon, "who ſhould make two hundred and fifty neſts of "crucibles of different ſizes, the largeſt to hold "two quarts." In 1760 the premium was again offered: and in 1761 it was diſcontinued; the Society believing they had done as much as was in their power to eſtabliſh a manufacture of this article in England.

In 1759 a claim was made of this premium, and allowed. In 1761 there was one candidate for the premium; to whom alſo it was adjudged. In 1762 another claim was made on the Society, though they had diſcontinued their advertiſements for this article, through a want of knowledge in the candidate of that fact. But, however, the Society, finding the crucibles that were produced to be ſo deſerving of encouragement, gave a bounty of twenty guineas.

The Society, as we ſee by the above particulars, purſued the moſt proper means, and ſo far ſucceeded, as to have the future proſpect of excluding the uſe of foreign crucibles in England, by the introduction of thoſe of our manufacture: having actually procured quantities of ſuch as were found perfect to be made. But it does not appear, however, in the reſult, that the importation of the Heſſian crucibles is in any great degree prevented. The reaſon, why this, and many other ſimilar articles fail of being eſtabliſhed in rivalſhip of the foreign, is, the difficulty, that the manufacturers meet with, as

as to theſe kinds of matters, which are not articles of ſtaple trade, in diſpoſing of ſufficient quantities of the produce of their manufacture, at an advantageous price. This, when they are perſons in narrow circumſtances, obliges them to throw up the purſuit: and apply themſelves to ſome more certain branch of buſineſs. On the ſame rock, ſeveral undertakings, to introduce manufactures here of articles brought from abroad, have ſplit, after the means, as far as relates to the art, have been completely obtained. It were to be wiſhed, therefore, that when ſuch attempts miſcarry, and the undertakers are obliged to give them up, they would reveal their reſpective inventions or improvements to the Society, for a moderate reward. Becauſe, by that means, the invention being regiſtered there, for the uſe of any who would carry it into practice, perſons in a better ſituation, and capacity, to go through with the attempt, would in many inſtances take it up: and eſtabliſh it, in ſpite of thoſe difficulties, which were unſurmountable to the firſt undertakers.

There was another article, of the ſame kind, of which the Society took up the encouragement later. This was *the making, of Britiſh materials,* CRUCIBLES, *or* MELTING POTS, *fit for* ASSAYING TIN ORES. The crucibles or pots now uſed for this purpoſe are called black lead crucibles or pots; or blue pots: and are brought from abroad. They owe their reſiſtance to heat, in which their peculiar fitneſs for this purpoſe principally lies, to their having a conſiderable quantity of black lead in their compoſition: and, as our own country is known to afford this foſſil, it was preſumed, by that, or the diſcovery of ſome other compoſition, which

which might be ſubſtituted, we might procure this manufacture to ourſelves.

The Society, conſequently, in 1764, propoſed "to give fifty pounds to the perſon, who ſhould "make, in England or Wales, five hundred cru- "cibles, or melting pots, of Britiſh materials; "as fit for the purpoſes of aſſaying tin ores as thoſe "imported under the name of black lead crucibles, "or blue pots." In 1765, the ſame was again offered: and in 1766 the premium was dropt, in conſequence of a claim, made on the Society for this matter. For in 1766, there was one candidate for this premium; to whom the whole of it was adjudged.

The Society ſucceeded with regard to this kind, as well as the Heſſian crucibles, in the obtaining the matter, which was propoſed to be done. But the conſequence has hitherto been much the ſame as to both, with reſpect to the failure of introducing into commercial practice the art diſcovered. Whether it is owing, in this inſtance, to the reaſons before advanced for miſcarriages in ſimilar caſes, or whether the candidate was enabled by the premium to make the number of crucibles, by which he gained it, with advantage, though he could not otherwiſe have afforded them ſo cheap as the foreign; is not clear from any facts. But the Society, though they have diſcontinued the premium for this article in expreſs form, are actually promoting the ſame end, by their premiums now offered for the diſcovery of black lead, both here and in America. For if that foſſil ſubſtance could be procured at a cheap rate, the perſon who obtained the premium for this kind of crucibles would, of courſe, be enabled to make them to advantage.

There

There was another article of the Society's encouragement, which has ſo great an affinity with the making crucibles, that it is proper to mention it here. It is the *making* EARTHEN RETORTS, that would endure a very great heat. Such retorts, it was preſumed, would be of material ſervice in many operations: and the Society, therefore, offered, in 1757, "twenty pounds for the "beſt earthen retorts, made of Britiſh materials; "and equal in goodneſs to the retorts imported "from abroad." In 1758 this premium was again offered: but the next year it was diſcontinued, in conſequence of a claim, that was allowed to be good.

The *making* VERDIGRISE *in England*, was a matter which the Society early ſet about to procure by their encouragement. The whole, we at that time conſumed in the various manufactures to which it is neceſſary, was then purchaſed of foreigners, moſtly of the French, for our money. The quantity uſed is very conſiderable, as a dying drug, on the goodneſs of which ſeveral articles of our moſt material manufactures depend; and, in the colouring paper hangings, and ſeveral other kinds of paintings, in which great ſtreſs lies on it. Verdigriſe is copper corroded by any vegetable acid. It is made in France, and elſewhere, by rubbing copper-plates over with the marc, or remains of the grapes, after the wine has been preſſed out. That material is, indeed, wanting here. But there was juſt reaſon to believe, that the marc of apples, the dregs of a malt diſtillery, or other refuſe matter of an acid nature, might be ſubſtituted for it, with profit to perſons who were well ſituated to procure ſuch acid on cheap terms.

The making verdigriſe, therefore, cheaper, or better;

better; or preventing the neceſſity of purchaſing it abroad, even without any other improvement, were objects very deſerving of the Society's regard; and induced them to offer this premium in 1756. "To the perſon, who ſhall make the "moſt and beſt verdigriſe, equal in goodneſs to "the French, not leſs than one hundred pounds "weight, twenty pounds." This premium was again offered the next year. But, in 1758, it was raiſed to thirty pounds; and that year obtained. It was, however, continued to the year 1762: during which time there were ſeveral claims; but they were not allowed. In 1760, the Society pointed out, in a *nota bene* ſubjoined to the premium for that year, where the proceſs for making verdigriſe was to be obtained; and hinted thus at the proper materials here. "N. B. Ver-"digriſe may be made by moiſtening with "the cheapeſt and worſt ſort of cyder, the "marc or remains of apples, pears, gooſeberries, "currants, ſloes, crabs, blackberries, or any fruits "deprived of their juice by expreſſion, proceeding "afterwards by the proceſs mentioned in the "*Memoirs of the Royal Academy of Sciences at Paris* "for the years 1750 and 1753." In 1762 the Society, being convinced, that good verdigriſe could be made in England, turned their views to the eſtabliſhment of large works; and raiſed the premium to fifty pounds: requiring five hundred pounds weight at leaſt. A claim was made of the premium on this footing, and allowed in 1763: and the Society then, to encourage more extenſive undertakings, advanced the premium to one hundred pounds, requiring two tons at leaſt to be made. This was alſo obtained in 1764, by the ſame candidate, who received the premium the preceding

ceding year. In 1764 the advertiſements for this premium were diſcontinued: the end appearing to be fully anſwered.

The introduction of the preparation of verdigriſe in England, ſeems, therefore, evidently to have received its original, as a matter of diſcovery, from the Society's encouragement; and to have been afterwards gradually raiſed and advanced to its maturity by their care and patronage. Proof is now given to the public, that this commodity can be made equally good as the foreign, of Britiſh materials; which may be procured in great quantities. As the reſolutions of the Society, in 1763, ſet forth, on the authority of the beſt judges, after actual trials of it for the various purpoſes to which verdigriſe is applied, that the ſpecimen, produced in claim of the premium, was even ſuperior to the foreign. The eſtabliſhment of ſo conſiderable a manufactory, which has been carried on for ſeveral years, gives juſt preſumption, that this may be done with profit to the undertaker. There is the greateſt room to hope, therefore, that the whole of this article, as far as reſpects our own conſumption, will ſhortly be gained to ourſelves.

The Society, ſoon after their inſtitution, took upon them the encouraging the *improvement of* DYING. The great conſequence of which the beauty, and durability of colour, are to the manufactures, both of *woollen*, *linnen*, and *ſilk*, renders the art of dying one of the moſt important of any to our commercial intereſt: and, under every circumſtance, might, therefore, conſtitute it a very fit object of the Society's premiums. But, with reſpect to the dying woollen cloths, it was at that time believed, tho' miſtakenly, that, becauſe ſome of thoſe, manufactured in other countries, appeared of a better

ſcarlet,

ſcarlet, or black colour; and did actually hold their beauty longer in the wear, they were dyed by better proceſſes; and really excelled ours. The reaſon of this error, as we have ſhewn above, conſiſted in not obſerving duly the different texture and fabric of the cloths; on which, in fact, the ſuperior appearance and durability of colour in the foreign, ſolely, depended. This opinion furniſhed, however, a principal motive to the Society for offering premiums for *dying woollen*. But, allowing it to have no foundation, there were yet other reaſons, ſufficiently ſtrong, to determine them to turn their attention to this object.

Accordingly, in 1758, the Society offered a premium of twenty pounds, "for the fineſt jet "black, dyed in England, in a piece of ſuperfine "broad cloth, ſuperior in colour to any now dyed "in England, and neareſt to the fineſt foreign "dyed black cloth." This premium was not claimed: and it was diſcontinued the next year.

The Society, alſo, in the year 1758, propoſed to give a like premium of twenty pounds, for the beſt ſcarlet in grain, on the conditions offered for the dying black: and this premium was continued the next year. In 1760 it was augmented to fifty pounds; but, excepting that alteration, the advertiſement was the ſame.

The next year this premium was dropt: from the conviction the Society then received, that our dyes were not inferior to the foreign. But, in 1762, it was renewed under a different form. For now the Society offered fifty pounds, "for the greateſt "improvement in dying cloth in grain, with reſpect to quality and cheapneſs:" and did not ſpecify any particular colour; or compariſon with

the foreign. Thus it was continued every year, till 1766; when it was wholly dropt.

Theſe premiums were never given: and, indeed, the foundation, on which they were originally offered, as appears in the condition of the advertiſement, were erroneous; as we have before obſerved. For the Engliſh dyes of black and ſcarlet were not inferior to the foreign: as the Society were afterwards convinced: but the beauty of the colour of foreign cloths, was, ſolely, owing to their texture.

The dying flax or cotton, was, at the time the Society firſt caſt their views on the encouragement of improving it, in a ſtate much more remote from perfection than the dying woollen: though it is a matter of the higheſt conſequence to ſeveral of our manufactures; particularly thoſe carried on at Mancheſter, to a very great extent: in which, where ſtripes of red, yellow, or green are wanted, they have been moſtly obliged to intermix woollen with the linnen.

The improving the dyes of *linnen* and *cotton* was, conſequently, a very fit object of the Society's encouragement: and, therefore, in 1756, they propoſed "to give a premium of ten pounds, for "the dying flaxen yarn of a laſting and firm green "colour." They, alſo, offered, the ſame year, another premium "of twenty pounds, for dying "flaxen yarn ſcarlet in grain, of the beſt holding, "and faſt colour." Premiums were continued to the year 1759 for theſe articles: but the ſums were augmented for both. The Society then propoſed "to give twenty pounds, for a ſample, of not "leſs than two pounds weight, of flaxen yarn "dyed of a laſting and firm green colour;" and offered thirty pounds on the former conditions,

"for

" for dying flaxen yarn ſcarlet in grain." In 1760 they ſtill proceeded to offer the ſame premium for the green colour: but then propoſed " to give " forty pounds for the ſcarlet in grain." In 1761 they made farther alterations. They this year propoſed to give fifty pounds " for a ſample of flaxen " yarn dyed of a laſting and firm yellow or green " colour." The premium for the ſcarlet in grain remained the ſame as formerly. In 1762, the premium for dying yarn green or yellow was omitted, and that for dying ſcarlet in grain was thus changed: " For the greateſt improvement in dying cotton " ſcarlet or crimſon in grain, with reſpect to qua- " lity and cheapneſs, fifty pounds." The next year the premium for the green was thus renewed: " For the greateſt improvement in dying cotton or " linnen yarn yellow, forty pounds: and for the " ſame in dying green, twenty pounds." The premium for the ſcarlet in grain was continued. In 1764, it was again offered: and the premiums for the dying linnen and cotton yarn green and yellow were continued. The premiums for theſe three articles were again repeated in 1765. In 1766 the premiums for the dying linnen and cotton yarn ſcarlet or crimſon, were diſcontinued. But thoſe for dying yarn yellow and green were offered, though for the laſt time. For in 1767 they were, likewiſe, diſcontinued.

The premium for dying cotton and linnen yarn green was claimed, in 1766, by one candidate: to whom the Society adjudged it. In 1767 there was one candidate, who claimed and obtained the premiums both of the yellow and green.

From the time of the commencement of theſe premiums, conſiderable improvements have been made in the dyes of cotton and linnen yarn: and there is

great reaſon to believe, the Society's advertiſements have been a principal means of incitement to the making them. But it is much to be regretted, that, notwithſtanding methods are known for dying thread well of moſt colours; yet, through the ſordidneſs of dealers, what is commonly found in the ſhops is exceedingly bad; and with ſuch an imperfect ſuperficial tinge, that it can hardly bear to be drawn, in ſowing, through any harder kind of ſtuff, without loſing a great part of the colour.

There was another important article of dying, of which the Society took upon them the encouragement. This was *the dying* COTTON *of a* RED COLOUR, as practiſed in the Eaſt; and commonly called the *Turky red*. The particular advantages of this kind of dye does not conſiſt ſo much in the beauty of the colour, as in its being ſo fixt that it will admit of being boiled in a ſolution of pearl aſh, or any other fixt alkaline ſalt, without injury to the colour. This firmneſs of the colour renders the cotton, thus dyed, peculiarly uſeful in the Manchester, or other manufactures, in which ſtripes of red are interwoven with the white cotton. For the cotton dyed in this manner, being wrought in ſtripes with unbleached, or, as it is called, grey cotton, will endure the treatment requiſite in the cleanſing and bleaching cotton, without any damage to the colour. Whereas the red colour of ſuch as is dyed by the common method, is deſtroyed by being boiled in a ſolution of pearl aſh in water: which is a neceſſary part of the proceſs of cleanſing the grey cotton. A great advantage, therefore, ariſes from this dye. Becauſe the ſtripe pieces may, by that means, be wrought of grey cotton with the mixture of this red: and one cleanſing alone is ſufficient to finiſh them. Though when bleached

ed cotton is uſed for ſtriped work, as muſt be the caſe when cotton dyed in the common manner, or even red worſted are employed, to avoid the boiling the whole in a ſolution of pearl aſh, there muſt of courſe be a ſecond cleanſing. This ſaving, together with ſome degree of beauty, attending the wear of cotton thus dyed, and which rather improves than is injured by moderate waſhing in ſoap, had even induced ſome manufacturers to procure cotton to be dyed in this manner in Turky: and the French have a work at Smyrna, where they dye great quantities for the uſe of their own manufactures. The obtaining this method of dying, in a practicable manner, with reſpect to expence, appeared, conſequently, to be an improvement of great value: and the Society, having been properly apprized of theſe facts, offered, in the year 1760, the following premium. "For "dying cotton yarn of the ſame red colour "as that which is dyed in Turky; and which, like "the Turky, will keep its colour after many re-"peated waſhings; fifty pounds." The next year it was diſcontinued, in conſequence of the premium's having been adjudged to a candidate. But, in 1762, having reaſon to believe that the dye, for which they had given this premium, did not anſwer the end; and being ſollicited by ſome very good judges of the importance of this object, to renew the premium; the Society propoſed "to "give one hundred pounds for the greateſt im-"provement in dying cotton, to anſwer the pur-"poſes of Turky or India red." They continued to offer this premium till 1764; when a claim was made, and allowed: and, ſuppoſing they had then gained their purpoſe, they dropt any further concern with this dye.

It does not appear, notwithſtanding the giving theſe premiums, that this matter has been practicably obtained. The circumſtance of the neceſſity, that the colour ſhould ſtand the boiling in pearl aſh and water, was obſcure; and known only to thoſe, who are particularly acquainted with ſome branches of the cotton manufactures: and it is to be feared, was not, on ſufficient trial, made a teſt in the determinations in favour of the dyes the premiums were given to: on which the beauty of the colour ſeems to have had the greateſt ſhare of influence. Theſe dyes were not founded on the Eaſtern proceſs, but improvements of thoſe commonly uſed for cotton, or in the printing linnen &c. here. But the Society's premiums, diffuſing the knowledge of this matter, did occaſion the procuring the real recipe of the dye uſed at Smyrna: which was obtained from thence by more than one perſon. Even this has not, however, had the deſired effect, of introducing that dye into practice here. For ſome difficulties, reſpecting the price, and great conſumption of the ingredients employed in the proceſs, have diſcouraged the uſe of it, even in the hands of ſome manufacturers who were beſt ſituated to have made advantages of it. There is, nevertheleſs, great reaſon, from facts, to believe, that theſe difficulties will be removed, by the aid of perſons better acquainted with the principles of dying; who may, by the ſubſtitution of cheaper ingredients, and reforming the proceſs, with reſpect to the unneceſſary or leſs expedient part of the operation, render the dying this colour advantageouſly practicable. So that we may enumerate this very important article among thoſe, by which the Society have greatly promoted the commercial intereſts of Great Britain.

The

The Society's views, with reſpect to the improvement of DYING SILK, were confined to grain colours: as we appeared moſt deficient with reſpect to them, eſpecially in the ſcarlet. They, therefore, offered in 1762, "for the greateſt improvement in dying ſilk in grain, with reſpect to "quality and cheapneſs, forty pounds." This premium was advertiſed the three following years without any alteration: but, in 1766, the Society offered "forty pounds for the moſt beautiful and "durable ſcarlet dyed in ſilk with cochineal:" which premium was again repeated the next year; and then dropt. This premium was never gained.

Beſides theſe particular premiums for grain colours in cloth and ſilk, the improvement of them in any way, or the extenſion of them to flax or cotton, were thought of ſo much conſequence, that the Society, in 1757, offered a premium for them in general. This was, "for the beſt method of "improving grain colours, and rendering them "cheaper, ten pounds." In 1758 it was again offered. The next year the advertiſement for this article was the ſame, excepting that the premium was augmented to thirty pounds. In 1760 it was again increaſed to forty pounds, and continued till 1766: which was the laſt time it appeared under this general form. For, in 1762, it was dropt with great propriety; being too general and inexplicit to have a proper effect. The Society's propoſals ought always to be confined to ſimple objects; and the conditions clearly ſpecified. Otherwiſe, where things are brought in competition with others, that are of a different nature, the perſons capable of improving any particular article, within the view of the propoſed premium, fail to be ſtruck with the offer; or are deterred, by ſuppoſing

poſing their chance to be ſmall againſt a variety of other improvements, in different ſubjects that may be brought. It is, moreover, very difficult to ſettle the comparative merit of performances where the ſubjects are various; and to do juſtice between the Society and the candidates, where no preciſe terms of claim are aſcertained. The Society's intentions in this premium were, however, ſtill carried on by the particular diſtinct premiums more properly offered for the improvement in dying grain colours, in woollen cloth, cotton and ſilk ſeparately.

The Society took up more lately another ſubject reſpecting dying woollen cloth. This was the introducing *a new method of* DYING BLUE: which was to be done with *materials not at preſent employed for that purpoſe:* and indeed on principles different from thoſe of other dyes commonly in uſe. The obſervation of the beauty of the *pigment* called PRUSSIAN BLUE, when well prepared; the cheapneſs of the materials uſed in making it; and the probability that the proceſs might be extended to dying; gave room to preſume, that a conſiderable improvement in dying cloth blue, might be made by a due application of the ſame proceſs: eſpecially as the blue produced from indigo is never bright; and the Saxon blue, which has much the advantage of indigo as to that particular, is extremely defective in durability. The Society, therefore, to incite proper trials, offered, in the year 1763, the following premium. "For the "beſt ſpecimen of woollen cloth, or yarn, dyed "on the principle of making Pruſſian blue, or "any other method not now in common uſe, fifty "pounds." This premium was continued till 1766;

1766: when it was dropt: having never been claimed.

There was another article, reſpecting cotton and linnen, which is of the nature of dying, that the Society more lately endeavoured to procure for the public. It is, the diſcovery of a method *of* PRINTING *a good and firm* YELLOW COLOUR *on linnen and cotton*. At preſent there are no colours in common uſe, that can be laid on by the plates, and rendered faſt at one operation, without the ſubſequent action of ſome fluid to fix them. I ſay, in common uſe; becauſe a green has been printed at one particular place. The advantage, however, of ſuch colours, as could be ſo uſed, ſince the introduction of copper-plates for the printing linnen and cotton, appear to be exceedingly great: and the yellow being thought moſt eaſily attainable, the Society offered the following premium in 1767. "For the beſt faſt yellow colour printed on linnen, "or calico, at one operation, twenty guineas."

This premium was not claimed: and is the preſent year omitted in the Society's liſt; in order to give way to others that have been thought of more importance.

The diſcovery of a method for *the* EDULCORATION *of* TRAIN OIL was, likewiſe, an early object of the Society's endeavours at improvements, which depend on the chemical art. Among ſome other matters recommended to them, by the late Dr. Shaw, who was conſulted with reſpect to proper objects of their premiums, this was one. It was obſerved, that the very fœtid ſtate of the common train oil, rendered it unfit for many purpoſes, to which it might, otherwiſe, be applied. The putrid ſmell of the cheaper kind of ſuch as is burnt in lamps, rendered it very diſguſtful even when uſed

for

for that purpoſe: and it was preſumed, this diſagreeable quality of fiſh oil was the principal reaſon, for its not being employed in wool combing, and many other uſes, where the coarſe olive oil, commonly called Gallipoli oil, is now employed. The rendering the cheap train oil fit for burning in lamps, without the nuiſance of the ſtink, appeared to have a tendency to keep down the riſing price of candles, which was growing a burthen to the poor, and a diſcouragement to ſeveral manufactures: and the ſupplying oil from our own fiſheries, that would ſuperſede the uſe of olive oil, which we purchaſe of foreigners, was, neceſſarily, productive of great national ſaving. Theſe ſeemed very weighty reaſons for the Society's taking up this matter.

They, accordingly, in the year 1757, publiſhed the following advertiſement of a premium. "For "an effectual method to edulcorate train, or ſeal "oil, for the uſe not only of the clothiers, ſope-"boilers, &c. but to anſwer the ordinary purpoſes "of olive oil, ten pounds." It is to be remarked, that in the caſe of this premium, as of moſt others, where the object is the invention of any art, the method was not required by the Society to be revealed. This advertiſement was continued in the years 1758, 1759, and 1760; and diſcontinued in 1761.

It does not appear there was ever any claimant for this premium, except one in the laſt year, who produced a ſpecimen of oil pretended to be edulcorated; and of the ſame oil in its original ſtate. On compariſon, it was difficult to ſay which of them was the worſt. For the operation had added an empyreumatic ſmell to the putrid fœtor, which was very little diminiſhed: and the colour was rendered darker, with an opake appearance. The claim was, therefore, rejected: and the premium then

then diſcontinued, as not appearing to anſwer the end. Indeed there is no reaſon to wonder, it had not a better effect: conſidering, it was only ten pounds for a matter, that could ſcarcely be ſuppoſed attainable without a long courſe of experiments, made at a conſiderable expence: the utmoſt, which could be done by filtration through ſand, or other ſubſtances; by waſhing with water; by ventilating with air; or by other ſuch ſimple means; having been known to have failed to anſwer the purpoſe.

But though the Society's endeavours, by the way of premiums, to obtain this matter did not ſucceed, yet their having ſtarted the notion of the utility and practicability of it, obtained them at length their end in a complete manner. A member of the Society was hence led to make a great number of experiments, and at laſt diſcovered a method, by means of boiling heat, and the addition of ſome cheap ingredients, to render the oil entirely ſweet and colourleſs; and another method, by means of a ſlight addition, without heat, to take off a conſiderable part of the fœtor from very ſtinking oil. He informed the Society of theſe circumſtances, after the premium was diſcontinued; and, having ſent ſpecimens to them, offered to reveal the two methods for the uſe of the public, if they would allow him a hundred pounds, as a reimburſement of the expence, he had incurred in bringing this art to that ſtate. The Society received the propoſal, and after trials made on the oil in wool-combing, and by other means, readily cloſed with it. But while this was in agitation, it had been obſerved, that, though the proceſs, in which heat was employed, purified the oil to a very great degree, and might be of advantage, where a great quantity could be prepared at

the ſame time; yet, requiring a particular apparatus, it was not ſo well accommodated to the uſe of oilmen in general. But that, if the ſlighter method without heat could be improved, ſo as to render the common train oil, uſually called *vicious* oil, as ſweet and good as that kind called the *ſperma-ceti* oil, it would be a very great advantage to the public, for the reaſons above advanced. The propoſer, therefore, again applied to a freſh courſe of experiments; and having improved this method, ſo as to make the vicious oil equal in colour, and ſuperior in ſweetneſs to the ſperma-ceti; and to burn with much leſs ſmoke and ſmell; he offered the diſcovery of this, likewiſe, to the Society. The ſeveral proceſſes were accordingly revealed: and the oil prepared, examined and tried by a committee: in conſequence of which, the Society came to the following reſolutions.

"That the ſpecimens of ſtinking train oil, "ſubjected to experiment, are edulcorated and "purified, through means of the proceſſes, to the "degree propoſed: that the proceſs with heat may "be performed at an expence not exceeding forty "ſhillings per ton, including waſte; that the "operation is eaſily practicable: that the Green-"land oil, purified by the firſt proceſs, without heat, "is improved for the uſe of burning: that "the propoſer has complied with the conditions "on which the Society agreed to reimburſe him in "the ſum of one hundred pounds, in conſideration "of the expence, incurred by him before the firſt "propoſal to the Society, and that he is intituled "to the ſame."

But ſome particulars expreſſing doubts, as to the improved proceſs without heat, becauſe it had been performed in the elaboratory of a member; and

and the ſubject oil not retained, during that time, in the cuſtody of the Society's officers; it was thought proper to have the proceſs repeated, and the oil kept in the hands of the Regiſter, in their office. On the examination and trial of this ſecond parcel ſo prepared, the Society came to theſe further reſolutions.

"That the oil which has gone through the "proceſs, being compared with the ſame oil in "a crude ſtate kept in a vial corked up, is con-"ſiderably improved in colour and ſmell; and on "burning appears conſiderably improved, both "in clearneſs of light and ſmell, as well when "burning as upon blowing out the flame: and that "it greatly exceeds the common ſpermaceti oil in "colour and ſmell, and being tried in a lamp caſt a "clearer and better light, and during the burning "exceeded the ſame in ſweetneſs of ſmell."

Theſe three ſeveral proceſſes were afterwards publiſhed by order of the Society.

The diſcovery of the edulcoration of train oil was thus not only obtained by the Society, but laid open to the public. With reſpect to the application of oil ſo purified to the purpoſes of wool-combing, it does not yet ſeem to have made the progreſs which might have been expected. A conſiderable apparatus is required, to perform the operation with advantage; and there is frequently a neglect of ſuch matters as are attended in the beginning with any ſeeming difficulty. Whence we ſee, in ſeveral other inſtances, that ſome time has elapſed before any perſon, properly ſituated, has undertaken to carry into actual practice things of a very certain and uſeful nature. The other proceſſes have been privately uſed by dealers, who mix the oil, edulcorated by the improved proceſs, without heat

heat with the ſpermaceti oil, which is even rendered better by it; or ſell it under that denomination. This method of treating oil has, alſo, been found particularly uſeful in Rhode Iſland, and the other places where the blubber, train, and ſpermaceti are carried from the fiſheries, in order to their being ſeparated and prepared for the market. On the whole, theſe proceſſes have not been hitherto ſo generally applied to the purpoſes for which they were intended, as to produce the whole benefit and advantage to the public they are capable of affording. Perhaps in this, as in ſeveral other inſtances, ſomewhat further may be wanting from the Society, to render effectual what they have done, by reviving and propagating the knowledge of the utility, or information of the means, which are wanting, in ſuch caſes, to incline, or enable numbers to attend practically to ſuch novelties.

The improvement of *making white or tranſparent* VARNISH *in England*, was alſo an object of the Society's purſuits. The very increaſing demand for varniſhed work; as well for carriages, as for hand-waiters, dreſſing boxes, ſnuff-boxes, and many other extenſive articles, both of home conſumption and exportation; rendered the art of preparing and uſing varniſh, of extreme great conſequence. The improvement of it ſeemed the more neceſſary, likewiſe, from our ſuppoſed great inferiority in this art to the French, particularly to Martin at Paris, in the exerciſe of this art. Poſſibly, there was not ſo much foundation for this preference, as was generally imagined. There is reaſon to believe very fine pieces in ſmall work could have been produced here, if the ſame prices had been given for them. And as to the durability of the varniſh in coaches, on which much ſtreſs has been laid,

more

more ought to have been aſcribed to the very rough ſtate of our ſtreets at that time, compared to thoſe of Paris, than to any other difference. This appeared by the quick deſtruction of the varniſh in coaches brought from France; that was found to be nearly as ſoon crackt and ſpoilt by the jolting and ſhocks, to which the carriages were expoſed on our rough pavement and hilly ſurface of the ſtreets. There was, nevertheleſs, ſufficient ground to render this a proper matter of the Society's attention; and they publiſhed, in 1757, the following advertiſement.

"The Society will give twenty pounds to the "perſon, who ſhall make one gallon at leaſt, of "the beſt, moſt tranſparent, and colourleſs var-"niſh, equal in all reſpects to Martin's at Paris, "commonly called copal varniſh. The properties "whereof are great hardneſs, perfect tranſparency, "without diſcolouring any painting it is laid over, "being capable of the fineſt poliſh, and not liable "to crack." This premium was continued in the ſame manner for four years. In 1762 it was augmented to thirty pounds: and the next year omitted. But it was offered again in 1764; and continued in 1765. In 1766 this premium was dropt.

In 1763, fifteen pounds, part of the premium, was adjudged to one of the candidates; who that year made a claim and produced ſome beautiful pieces of work. But the varniſh did not ſtand ſo well as the French, againſt which it was tried. Since this the premium has not been obtained.

Continual improvements are making with us in this important art: in the exerciſe of which, for cheaper articles, we both underwork the French, and exceed them in the durability: as will be ſeen on the compariſon of a common Birmingham *papier*

 maché

maché ſnuff-box, with a French one of low price. The French purſue the old method of laying a coat of whiting under the varniſh: which renders it ſubject to crack and peel off: eſpecially if any moiſture reach the whiting. Our people, who firſt, at Birmingham, began, with varniſhing iron, where clear coating as it is called was not practiſed, followed the ſame method, when they proceeded to varniſh *papier maché*; and laid the varniſh on the ſubſtance itſelf: which renders the varniſh more durable. This will appear on examining the two kinds.

To theſe improvements in varniſhing, the Society's advertiſements have much contributed: as they have been the occaſion of a very great number of experiments on copal, gum animi, amber, and the other ſubſtances, that promiſe, by their ſolution in ſpirit of wine, eſſential oils, or ſubſtantial oils, to afford a fine varniſh.

The *making* WHITE ENAMEL *in England*, was thought, alſo, a proper object of the Society's encouragement. The increaſing demand for this article, by the extenſion of ſeveral manufactures in which it is uſed, ſuch as thoſe of dial plates, dreſſing-boxes, ſnuff-boxes, and other toys; and the being then under a neceſſity of having it from abroad; led the Society to the attempting to introduce the preparation of it here, by means of their premiums. They therefore offered, in 1760, "fifty pounds, for making enamel of Britiſh materials, equal in whiteneſs, and in every other "property, to the Venetian." The advertiſements were continued to 1766.

In 1760, there was a claim for this premium, though for ſome reaſon the Society did not allow it: but gave the candidate a bounty of ten guineas.

Notwithſtanding

Notwithſtanding the Society's premiums for white enamel have not been gained: yet very good has been made in England. But the circumſtance before aſſigned, with regard to other ſimilar caſes, of the difficulty which is found by perſons, who newly make any article, that is not conſumed in great quantities, to diſpoſe of it, unleſs where they are particularly ſituated, has been hitherto a check to the eſtabliſhment of any conſiderable work for making white enamel. The publication of a good proceſs would, therefore, be the moſt probable means of compleating the Society's views, by enabling ſome perſon, who had the proper conveniences, and the opportunity of a due vent, to undertake this matter.

The procuring the diſcovery of a *ſubſtitute, to anſwer the purpoſes of* BORAX *in ſoldering metals*, was made another object of the Society's premiums. The ſucceſsleſs attempt, that had been before made, as we ſhall ſee below, to encourage the diſcovery of a method of producing borax itſelf in England; and the little ground there was to hope for the attaining it; had occaſioned the premiums for that article to be diſcontinued. But the price of borax, during the laſt war, having become very high; and the uſe of it in ſeveral arts and manufactures, where ſoldering metals is required, being neceſſary; the thinking of a ſubſtitute for it, with regard to that uſe, naturally occurred: and, as there appeared no room to conclude ſuch a ſubſtitute might not be found out, the Society publiſhed the following advertiſement in 1762. "For five "pounds weight of any ſubſtance, made of Bri-"tiſh materials, that will anſwer the uſes of bo-"rax, in ſoldering, fifty pounds." This offer

was advertiſed to the year 1767: at which time it was dropt.

This premium was claimed in 1764; but the qualities of the ſubſtitute, produced for the claim, not being equal to thoſe of borax for ſoldering, the Society did not grant the premium. Though, as it there appeared ſome improvement, when this ſubſtance was compared with others, which had been tried for that purpoſe, they allowed ten pounds to the candidate, in the light of a bounty. The want of farther ſucceſs from the advertiſements, and the fall of the price of borax, diſpoſed the Society to drop this premium along with ſome others, that had ſtood ineffectually in their liſts for ſeveral years.

There was another, but leſs conſiderable object of diſcovery than moſt of the preceding, for which the Society offered premiums. It was the procuring VARNISHES, *or* COMPOSITIONS *to prevent* POLISHED IRON *from* RUSTING. Two kinds of ſuch compoſitions were propoſed. The one, a tranſparent, colourleſs, varniſh, that would hinder the acceſs of air and moiſture to the iron; and keep it from ruſting, without taking off from the luſtre or beauty of the poliſh. The other, a coat of any kind, that could be ſpread over the poliſhed part of iron, during the time any other unfiniſhed part was to be wrought, to preſerve it from ruſting: and which could again be taken off at pleaſure: without injury to the poliſh. As every improvement in manufactures is of ſome conſequence, the Society, finding ſuch varniſhes or compoſitions would have ſome utility, offered, in the year 1762, "fifty pounds for the firſt, or tranſparent kind: "and twenty pounds for the other."

The latter of theſe premiums was claimed the ſame

ſame year: and the claim allowed. The other was not claimed. The advertiſements for both were, however, then diſcontinued. The one obviouſly from the end's having been attained. The other, moſt probably, from ſome accidental omiſſion.

Theſe were the articles, reſpecting the improvements dependant on the chemical arts, for which the Society have actually given premiums; or, having advertiſed premiums, which were not gained, have obtained the end of their views, in a greater or leſs degree, by bounties or purchaſe.

There are ſeveral others, with regard to which, they have not had the ſame ſucceſs, though ſome of them are important as to their conſequences; and feaſible as to their practicability. But it is to be hoped, that the information of their utility, and the attention to them incited in the public, will yet in the end have the deſired effect. That this information may be ſtill more propagated, and the attention ſtill kept up, I will enumerate them here, with ſuch brief explanations, as may tend to render the Society's advertiſements moſt effectual to the propoſed end.

The eſtabliſhing *works for making* SALTPETRE *in England*, was one great object of the Society's endeavours. The large conſumption of ſaltpetre, as well in the making gun-powder, as in various uſes reſpecting the moſt important manufactures and trades; the being obliged to have all we want from the Eaſt-Indies, whence our ſupply of this commodity is ſubject to be cut off; and the example of other countries in Europe, who have ſucceeded in their attempts to make it in quantities; afforded reaſons for believing this to be a very fit article for their premiums. And the Society, therefore, in the year 1756, propoſed, "to give one hundred

" pounds to the perſon, or perſons, who ſhould " make the beſt ten thouſand pounds weight of " ſaltpetre, fit for gun-powder, at one manufac- " tory, (by ſome method different from that ſpe- " cified in Mr. Nightingale's patent, copies where- " of were to be ſeen at the Society's office) within " three years, from materials the produce of Eng- " land or Wales; one hundred pounds weight " thereof to be produced by way of ſample, for " proper trials thereon: and for the next beſt like " quantity, within the ſame time, fifty pounds." In 1757, the Society offered, " leſt waiting ſo long " a time as three years, propoſed in the premium " of 1756, might diſcourage an immediate appli- " cation to the making ſaltpetre, one hundred " pounds to the perſon, or perſons, who ſhould " make the *firſt* ten thouſand pounds weight of " ſaltpetre, fit for gun-powder, in manner, and " on the terms before deſcribed: alſo, for the *ſe- cond* like quantities, by a different perſon, fifty " pounds." In 1758 theſe laſt premiums were offered again. " Whereby an opportunity was af- " forded to the perſon, who ſhould produce the " *firſt* and *beſt* ten thouſand pounds weight of ſalt- " petre, of obtaining two hundred pounds: and " to ſome other perſon, who might produce the " ſecond beſt, and like quantity, one hundred " pounds." Books, in which the proceſs for making ſaltpetre was to be found, were alſo pointed out. In 1759, and 1760, theſe premiums were again repeated: and the three ſucceeding years, three hundred pounds were, likewiſe, offered for the ſame quantities. In 1764, the whole was diſcontinued.

Theſe premiums were never claimed. For, notwithſtanding the ſpecious reaſon abovementioned,

tioned, of the inſtances of other European countries, the production of ſaltpetre here is commercially impracticable, by any method, or on any principles, hitherto known. There is, indeed, no place where nitre, which is convertible into ſaltpetre, cannot be produced from earths, that accidentally contain it: as they are found more or leſs replete with it, in every country; and ſuch earths may, alſo, be formed every where, by expoſing proper ſubſtances, or compoſitions of ſubſtances to the air. But in our country, the price of labour, and the other contingent expences, riſe ſo high, that a very great loſs, inſtead of gain, muſt accrue to any perſon who ſhould make a conſiderable quantity. This was, however, known, at the time the Society inſtituted this premium, only to the few, who had gained an opportunity to form ſuch a judgment, from obſervations on facts occurring in more confined attempts, that had been then made and concluded. But it has ſince been more obviouſly verified, by the event of an undertaking at that time on foot: where, after the expence of ſix or ſeven thouſand pounds, the beds of nitre, of which there were a great variety, and ſome very properly formed, were found, on trials by the moſt able judges, not to afford ſo much nitre as would anſwer the expence of extracting it from the earth; and converting it to ſaleable ſaltpetre. The truth of the aſſertion, that ſaltpetre cannot be made here profitably, as in other countries, is, moreover, ſupported by a farther moſt unobjectionable evidence, ariſing from a fact relating to the ſame works. Before the undertaking was given up by the proprietors, two profeſt ſaltpetre-makers, who had practiſed this art in different places abroad, and had authentic public teſti-

monials of their abilities, were ſent for hither, to aſſiſt in that work; or to examine into the practicability of producing nitre with profit here. After making a due ſearch for nitrous earths, and computing the expence of labour, carriage, materials, particularly wood-aſhes, or other vegetable alkaline ſalts, in obtaining the nitre from them; as alſo that of artificial beds; it appeared from their account, that they could not produce marketable ſaltpetre here, at leſs than near three ſhillings per pound: whereas, what is imported by the India company, is moſtly ſold at, or under a fourth of that price. The event of ſome other undertakings to make ſaltpetre, which were on foot at the ſame time, has confirmed this obſervation; and ſhewn the impracticability of eſtabliſhing ſuch works here, as are carried on in France, Germany, and ſome other countries in Europe.

The Society, therefore, finding their premiums ineffectual; and being appriſed of theſe ſeveral circumſtances, eſpecially of the failure of the attempt abovementioned; in the conducting which, neither money nor ſkill had been wanting; diſcontinued with great propriety their advertiſements for this article. I thought proper, however, to be more explicit on this ſubject, that the authority of the Society for the practicability of making ſaltpetre with advantage here, as deduced from their premiums, and their referring to proceſſes in particular books, might not miſlead; nor be uſed, for the future, as it has been very lately, to induce perſons to enter into ſubſcriptions; or join in projects with deſigning people, to carry on ſaltpetre works. There has been already more miſchief done, in the preſent times, by errors, or impoſitions in undertakings reſpecting this matter,

than

than by any purſuit of a ſimilar kind. I have myſelf known ſeven or eight inſtances: of which, ſome have had very ruinous conſequences to the parties concerned, though they were in happy circumſtances at the time they firſt engaged. With reſpect to the Society, nevertheleſs, the object was very great; and the attainment appeared then feaſible. They pointed out the moſt likely means of ſucceſs; and offered a noble encouragement for the trial. When experience demonſtrated, that what was done elſewhere, was not ſuitable to the circumſtances of our country, they rationally gave the matter up.

Borax, being a ſaline ſubſtance, of great conſequence, in the practice of many arts and trades, particularly in ſoldering metals; and the whole we conſume being brought from abroad; it was thought proper by the Society, in the year 1756, to offer the following premium for *the diſcovering, or making it in England.*

"Borax being of great uſe in all vitrifications, in "the fuſion of ores, and abſolutely neceſſary in "ſoldering; and there being reaſon to believe it may "be diſcovered, or made in England; it is propoſed "to give, for ten pounds weight of borax, diſcover-"ed, or made in this kingdom, having the proper-"ties of that which is imported, twenty-five "pounds." The next year this premium was continued the ſame. But, in 1760, it was augmented to fifty pounds. In 1761, the advertiſement was thus altered: "For the greateſt quantity, not leſs than "twenty-five pounds weight, of tincal, or borax, "made "in England or Wales, fifty pounds." This was continued to 1762: and then with great reaſon dropt: there being, in fact, ſcarcely a ſhadow of probability, that the end ſhould be obtained. The

tincal,

tincal, or crude borax, of which the refined or common borax is prepared, is brought from the Eaſt Indies. It is a ſaline ſubſtance, artificially produced there from a foſſil production; which does not appear to have been hitherto found any where but in one place: though the uſe of borax has long prevailed, as well in almoſt every part of Europe, as in Aſia. There is very little likelihood, therefore, of the diſcovering here, what has been vainly ſought for in ſo many other places. For, perhaps, no object of chemical reſearch has been purſued by greater numbers than making borax. But at the time this premium was diſcontinued, borax being extremely dear, the Society, as has been abovmentioned, offered a premium for a ſubſtitute to it, that would anſwer the ſame purpoſes in ſoldering metals: which was a more probable means of obtaining a great part of the end propoſed, than by the ſeeking the diſcovery of borax itſelf here.

In the year 1757, the Society thought *the diſcovery of a mine of* BISMUTH, a proper object of a premium. This mineral, or ſemi-metal, is uſed in very large quantities in the practice of ſeveral buſineſſes, particularly by plumbers; or where compoſitions of metals, or ſolders are wanted. We are at preſent ſupplied with what we uſe of this article from abroad; and it was preſumed, that in the variety of minerals afforded by different parts of Great Britain, this might be found. The Society, therefore, offered, in 1757, "Fifteen pounds "for the greateſt quantity of Biſmuth, commonly called Tinglaſs, made from minerals, or materials, the produce of England, not leſs than "one ton weight." In 1758, the ſame ſum was offered; but only one hundred pounds weight were required. The next year the premium was augmented

augmented to thirty pounds: in which way it was continued till 1762; when it was dropt.

This premium was never obtained: and, indeed, it muſt have been the effect of ſome lucky chance if it had. It cannot be imagined, that thirty pounds, or even the uncertain profits of a production very little underſtood here, would be a ſufficient inducement to ſink a mine on purpoſe. But the utility of biſmuth, being pointed out by the advertiſement, a reſearch after it might be thence incited among the variety of thoſe minerals, which are laid open in working other mines: and, in that light, the Society have given the public a chance of obtaining this article.

The invention of *a compoſition for ſecuring* SHIPS BOTTOMS FROM WORMS, was another of the firſt ſubjects of the Society's encouragement. The very great injury, which navigation receives from the damage done to veſſels by the worms, is too well known, to leave any room for expatiating on it. The high probability, that ſome ſubſtance may be found; which, being uſed for paying or covering the bottoms of ſhips, will prevent the acceſs of the worms, or hinder them from attempting to penetrate; ſtands on the ſame evident grounds. There were, therefore, very cogent motives to influence the Society to take up this matter; and try, by their premiums, to incite the diſcovery of ſuch a compoſition; or bring it to due teſt, and public knowledge, if any ſuch had been already found out. They publiſhed, conſequently, in the year 1757. the following advertiſement.

"As a cheap and effectual compoſition for ſe-
"curing ſhips bottoms from worms, and other
"injuries, would be of great advantage to the
"public,

" public, in regard to the preſervation both of " merchant ſhips, and of ſhips of war, the So- " ciety propoſe to give for the beſt and cheapeſt " compoſition, which, on ſufficient trials, made " by the inventor, ſhould appear moſt effectual " for ſecuring ſhips bottoms from worms, and " other injuries, to be produced in 1760, fifty " pounds." In 1758, the Society imagining properly, that the inventor might be uncertain what trials to make; or find the making of them difficult; thought fit to take that trouble upon themſelves: and, accordingly, notified the ſame, by ſeveral advertiſements. In 1759, they offered a like premium for the year 1762. In 1762 they augmented the premium to one hundred pounds; and required " each candidate to lay, during one year, " two planks, one payed or prepared with his " compoſition, the other unpayed, in a place where " worms are known to be; and to produce a cer- " tificate that the prepared plank was preſerved " from the worms; and that the other was da- " maged thereby. In which caſe the Society " would provide planks for each candidate that " ſhould apply for them, which planks were to be re- " turned payed, or otherwiſe prepared, in order for " trial." In 1763, the ſame was continued. In 1764, the premium was raiſed to two hundred pounds, on the ſame conditions. The next year it was again offered: and in 1766 it was diſcontinued.

In conſequence of theſe advertiſements, a number of candidates ſent planks conformably, prepared, and unprepared: and they were diſpoſed of to various ports, where the worm was ſuppoſed moſt to abound. But the greateſt part of them miſcarried from the difficulty of maintaining a due correſpondence, as they paſſed through ſeveral

hands, reſpecting the diſpoſal of them and its events; and thoſe, which came back, did not afford any ſatisfactory proof of the efficacy of the remedy. In ſome, that did return, the unpayed planks had not been ſufficiently damaged, to afford proof of the effects of the preparation on the other. Theſe miſcarriages induced the Society, to require a previous teſtimony of the effectual operation of the compoſition, or ſubſtance for paying the planks, to be given, in conſequence of trials made before the application of the candidates to the Society. As this would reduce the number of candidates, and diminiſh the trouble, as well as perplexity, which the Society had experienced in diſpoſing of the planks, when there were a multiplicity of claims: and, likewiſe, furniſh ſtronger motives for the trouble, which ſhould be taken, from the greater proſpect of ſucceſs. But, notwithſtanding this, it appears a matter attended with ſo much difficulty, and embarraſſment, to determine the claims, though, otherwiſe, from the importance and ſeeming practicability, the object itſelf would be a very fit one of their purſuits, that they have, with very juſt reaſon, diſcontinued the offer of any premiums for it.

The finding out a *method of preventing the deſtruction of* TURNEPS *by the* FLY, was another object of the Society's purſuits of the ſame date. The great utility of turneps, in feeding cattle, eſpecially in winters, when fodder is ſcarce, has been before mentioned more than once: and the greateſt diſcouragement to the more general practice of it, as well as cauſe of failure in thoſe who do undertake it, is, this very injurious accident, to which the growing herbage of turneps is ſo frequently expoſed. It was, therefore, with reſpect to the momentous conſequences, a very fit object

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of the Society's views: and, in 1757, they offered the following premium: "For an effectual me-"thod to prevent or deſtroy the fly, which takes "the turnep in the leaf, ten pounds." It was again advertiſed in 1758. The next year the premium for this article was augmented to twenty pounds. And, in 1760, it was diſcontinued: having been never obtained.

There were, indeed, ſome claims made for it: but none of them for communications of methods that appeared ſatisfactory to the Society. The examination of theſe claims ſuggeſted a very good reaſon, notwithſtanding the importance of the ſubject, for diſcontinuing the premium. This was the difficulty of deciding on the merits of any propoſed methods, which had the ſpecious appearance of being effectual, without going through an extenſive courſe of experiments, that could not be made by the Society, nor with any convenience, under their inſpection. But it is ſtill a deſirable, and moſt probably an attainable matter, to diſcover a method of remedying, at leaſt in a conſiderable degree, the miſchief done to turneps by the fly: and poſſibly the ſpirit of purſuing this diſcovery, which the Society's adverti[illegible]ements have inſpired, may, hereafter, be the occaſion of it. During the deliberations of the Society's committees on the claims for their premiums, a gentleman of fortune, who attended as a member, mentioned a method, I ſhall take occaſion below to explain, which he aſſerted to have been found effectual: and which, from ſpeculation, appears extremely plauſible. This communication not being made in a formal way to the Society, was not preſerved in their papers. But ſome time after, I deſcribed it in a letter, I ſent to the *Muſeum Ruſticum*, mentioned

tioned above, on the Society's proceeding with reſpect to this ſubject, the marking ſheep, and the catching rats, inſerted vol. I. p. 385: where a particular account of the other methods propoſed or practiſed for preventing the fly, will, alſo, be found.

The diſcovery of a *method to prevent, or cure the* ROT *in* SHEEP, was, likewiſe, made an object of the Society's premiums, nearly at the ſame time as the preceding. The great damage ſuſtained by the public, as well as private people, from the miſchievous conſequences of this diſeaſe in ſheep, renders it a matter of the moſt momentous conſideration: and no concluſive argument can be advanced, why a remedy may not be applied to this evil. The Society, therefore, in the year 1757, propoſed to give ten pounds, "for an effectual method "to prevent or cure the rot in ſheep:" and continued it to 1758. The next year they augmented the premium to twenty pounds: and in 1760, it was diſcontinued.

There were ſeveral candidates for theſe premiums; but they did not appear to make out ſatisfactory claims. In the deciſions of them, however, the ſame objection occurred againſt the continuance of the premiums for this, as in the caſe of the preceding article. That is, the difficulty of determining on the merits of any methods propoſed, either comparatively, with each other, or abſolutely, without actual experiments; and the incapacity of the Society to make ſuch experiments; or even to gain accounts of them duly authenticated, when made by others. The matter was otherwiſe ſufficiently important, and worthy the attention of the Society: and the influence of their advertiſe-

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ments may poſſibly conduce to the completion of it hereafter.

The Society, likewiſe, in the year 1758, propoſed a premium for *the* DISCOVERING *a* VEIN *of the foſſil ſubſtance, called* BLACK CHALK. This ſubſtance is very generally uſed for drawing; at preſent wholly had from abroad; and not frequently to be obtained good. For theſe reaſons, a premium of twenty pounds was offered "to any perſon, who ſhould produce a ſpecimen of black chalk, equal in goodneſs to what is imported from abroad, taken from a mine in England, that could be wrought." This was diſcontinued in 1759.

It does not appear, that any claim was ever made for this premium. But it is not improbable, that a vein of good black chalk may hereafter be diſcovered here, and brought into uſe, in conſequence of the intimation given by the Society of its utility. It is in that light the premiums of the Society muſt be preſumed to operate, with regard to the diſcovery of valuable foſſils. For the actual rewards offered are ſo trivial, compared to the advantages which would accrue to the proprietors of the reſpective mines, or veins of foſſils, that they can ſcarcely be conſidered as additional inducements. It is, therefore, principally to diffuſe the information of the utility of ſuch matters, and awaken a due ſpirit of reſearch after them, theſe premiums have been inſtituted: and, by keeping up the remembrance of them, the end may be obtained through their means, even long after they have been diſcontinued.

The diſcovery of a *compoſition for marking* SHEEP, *without injuring the wool, as is done by pitch, which is almoſt generally uſed*, was one of the early objects of

of the Society's encouragement. They were then induced to offer a premium on this ſcore, becauſe pitch, which is now uſed on account of its cheapneſs, the facility of its being laid on the wool, and its durability as a mark, is not to be again taken out of the wool, by waſhing with hot water and ſope, nor any other methods uſed in cleanſing wool: and, conſequently, ſpoils not only the wool of the part where the marks are made, but, alſo, that of any other parts which come in contact with it, while the pitch is ſoftened by heat. This occaſions the deſtruction, as it is ſaid, of, at leaſt, an eighth part of the whole wool of thoſe ſheep that are marked with it; the loſs of which to the public has been, on the moſt moderate computation, deemed 40,000l. annually, and by ſome, a much greater, even 200,000l. Hence a remedy for this evil becomes a very conſiderable object with reſpect to the public intereſt; and a very fit one of the Society's premiums. There can be no doubt, but that a compoſition of cheap ſubſtances may be found out, which will have the properties required for this purpoſe; that is to ſay, be a durable mark, and yet capable of being waſhed out with hot water and ſope; and if the Society, by their encouragement, had procured the diſcovery of ſuch, it is preſumed, farmers, and other proprietors of ſheep, would readily uſe it. Moreover, it might probably be the means of a legal prohibition of the marking with pitch: which has not hitherto taken place, in conſequence of applications, that have been made on that account, becauſe nothing is at preſent generally known, which would ſupply its place for this uſe; and the want of durable marks would produce much perplexi-

ty and trouble to thoſe, who are owners of great numbers of ſheep.

However trivial, therefore, a premium for improvement in ſheep-marking, may ſeem, at firſt view, to thoſe who are not apprized of theſe circumſtances, it was certainly one of the moſt judicious and momentous premiums the Society ever offered: though it has not hitherto had the deſired effect. The Society therefore, in 1758, adverſtiſed, that they would give "twenty pounds, for "the diſcovery of any cheap compoſition, of a "very ſtrong and laſting colour, for marking "ſheep, which will endure and bear the weather "a proper time; and not damage the wool, as "pitch, tar, &c." The next year this premium was continued. But, in 1760, it was omitted. However, in 1761, it was augmented to fifty pounds; and again offered. The next year this premium was ſuſpended, on account of taking time for the report of a trial, then making on the ſheep themſelves, of a compoſition, which had been ſent to the Society by a candidate; and which had undergone ſome operations, with a promiſing appearance. The matter has not been, however, reſumed: though that compoſition was rejected from the event of the trial.

There have been many candidates for theſe premiums; and the Society have proceeded with great caution and propriety in their determination on their claims. They at firſt tried the compoſitions, only by expoſing them, for a proper time, to the weather; but, finding this not a ſufficient teſt, they ſince tried them on the ſheep themſelves. This occaſioned the ſuſpenſion of the premium abovementioned. But as the Society's intentions have not been hitherto anſwered; and the matter is of great conſequence,

conſequence, and of a practicable nature; it were to be wiſhed, they ſhould not give it up.

The Society, likewiſe, turned their attention to the eſtabliſhing the *preparation of* SAL AMMONIAC *in England.* It is a commodity, of which a conſiderable quantity is uſed in medicine, and in the practice of various arts and trades: and which, at that time, was not made in Great Britain, at moſt not in any material quantity. There had, indeed, been many attempts to it; and ſeveral conſiderable works had been eſtabliſhed. But ſome of them, from the defect of the kind produced, and others, from the failure of due profit in the returns, had been then diſcontinued.

This was, therefore, a very proper object of the Society's encouragement: and they publiſhed, in 1759, the following advertiſement.

"Sal ammoniac being neceſſary in medicine, "and many branches of trade, great quantities of "it are imported, though it may be certainly pre- "pared in England; therefore it is propoſed, to "give a premium of thirty pounds to the manu- "facturer, who ſhall make the greateſt quantity of "the beſt ſal ammoniac, equal in goodneſs to the "beſt imported, not leſs than five hundred weight, "at one manufactory: fifty pounds weight of "which is to be produced as a ſample."

In 1760, the premium was augmented to fifty pounds; and was continued to the year 1763, without any material alteration in the advertiſement. But, in 1763, it was propoſed to give, on the ſame general terms, "one hundred pounds, to "the perſon, who ſhould make the greateſt quan- "tity of ſal ammoniac, not leſs than two tons, "equal in goodneſs to the beſt foreign imported."

It ſtood thus to 1767; but is omitted in the premium book of the preſent year.

Theſe premiums were never obtained. Though, while the Society was advertiſing them, the eſtabliſhment of the preparation of ſal ammoniac, in Great Britain, was continually gaining ground; and is at length compleated: as there are now ſeveral conſiderable works on foot. During the time the fifty pounds were offered by the Society, for the greateſt quantity, not leſs than five hundred weight, ſpecimens were produced to them, of ſuch, as was perfectly good. And there were more than one work ſet up in Scotland, that made quantities, which would have gained the premium, had it been extended thither. The Society, therefore, raiſed the reward to one hundred pounds, and the quantity to two tons, with a view to encourage larger undertakings. This was claimed: the quantity of two tons being alledged by the candidate to be made; and the ſal ammoniac ſent to the Society as a ſpecimen, found, on full trial, to be good. But the claimants having failed to comply, in other reſpects, with the conditions of the advertiſement, the premium could not be given. There are, moreover, ſeveral other works in Great Britain: one, at leaſt, of which has made more than the quantity required to gain the premium: but it does not appear, why the proprietors declined any claim of it. This article, therefore, is now obtained, to the full intent of the Society's views: and the advertiſements of their premiums, though, from ſome circumſtantial deficience in the candidates claims, the premiums themſelves have never been allowed, have had ſufficient influence to incite the purſuits, which have led to this ſucceſs.

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The diſcovery of an *effectual method of deſtroying* RATS, *by taking them alive*, was, alſo, made an object of the Society's premiums, at nearly the ſame period. The catching rats may ſeem, at firſt, a trifling concern; and below the notice of the Society; but it will by no means appear ſo, on more mature conſideration of facts. If we reflect on the damage which the public ſuffers from the depredations of theſe rapacious animals, we ſhall ſee, that the increaſe of them is one of the greateſt evils of that kind which can befall us: and yet not only ſuch increaſe prevails at preſent; but the introduction of a new ſpecies of them of late years, much larger, more voracious from their ſize, and more difficult to be deſtroyed, from their being in ſome degree of an amphibious nature, and breeding in drains or water-courſes, renders theſe noxious creatures yet more formidable. The damage, which the public ſuſtains, by the loſs of corn only, from rats, is computed at ſome hundred thouſand pounds a year: beſide that incurred by their devouring or injuring other commodities: and the very diſagreeable domeſtic annoyance of them where they abound. Theſe circumſtances certainly conſtitute the finding a remedy for this evil, a matter of the higheſt concern: and the Society had ground to believe, their premiums might be the means of procuring ſuch a remedy. It was very well known, there were perſons, who made a profeſſion of deſtroying rats, that could, in a ſhort time, free, to a great degree, or wholly, any place from them, by taking them alive: and it was a prevailing notion, that this was done by means of ſome *preparation*, which allured them to come together; and had ſuch influence on them, that they might be eaſily caught while under its operation.

The Society, therefore, at the earneſt ſollicitation of many members, and particularly ſeveral perſons of great quality and character, formed a view of inducing ſome perſon poſſeſt of the ſecret, to lay it open to them, for the uſe of the public: concluding, that being maſters of it, any perſons whoſe granaries, houſes, &c. were infeſted with rats, might eaſily free themſelves from them without the neceſſity of employing profeſt rat-catchers. Accordingly, in 1760, they advertiſed the following premium. "The Baltic rat, having of "late years greatly increaſed, ſo as, in many places, "and eſpecially on board of ſhips, to be very de- "trimental; and the deſtroying them by arſenic, "being ſometimes attended with great miſchief; "a premium of fifty pounds will be given to the "perſon, who ſhall diſcover to the Society, the "moſt effectual method of taking them alive, in "order for the more ſecurely deſtroying them. "A ſpecimen of the preparation is to be commu- "nicated to the Society, in order for them to form "ſome judgment of its value, and aſcertain its "effects." The next year this premium was dropt.

There were a number of claimants for this premium. But, from ſome unlucky miſtake of the intention of the Society, they ſent traps inſtead of an account of ſuch a preparation, for alluring and intoxicating, or faſcinating them, as it was believed was uſed by the profeſt rat-catchers. This was the caſe of all except one, who only deſcribed a method, very far ſhort, even in pretenſions, of what was intended to be required. The Society were, therefore, of opinion, that they had no claim to the premium: as not having in the leaſt produced what was required; and the advertiſement not appearing

pearing to have any effect on the perſons, whom it was intended to influence, it was diſcontinued. There are, indeed, two ſtrong reaſons why it did not ſucceed. The one was, that the ſum offered is not a ſufficient conſideration for a man to lay open the ſecret of a buſineſs, by which he gets his livelihood. The other was, that, on a diſcuſſion of the matter to determine the claims, it appeared, from a conſiderable field of information, which was then obtained, the profeſt rat-catchers did not accompliſh the deſtruction of the rats, or take them, by the ſimple uſe of any one compoſition or ſubſtance; but by the practice of various means to allure, and bring the whole number of rats together; and then to kill, or intrap them: in the performing of which, the ſame acquired ſkill and dexterity were neceſſary, as in the practice of other ſimilar arts. The Society, therefore, diſcontinued the premium: as not likely, at leaſt in that form, to anſwer the propoſed end, of procuring a diſcovery of the art of the profeſt rat-catchers from any of themſelves. The examination of the claims did, however, occaſion many gentlemen, who had obtained knowledge from the rat-catchers, to communicate what they had obſerved or gained; the ſubſtance of which, together with a more particular account of the Society's proceedings, with reſpect to this article, the preventing the fly in turneps, and the marking ſheep, I imparted to the public, in a letter publiſhed, as before mentioned, in the *Muſeum Ruſticum*, vol. I. p. 383. The endeavours of the Society, with relation to this article, have, conſequently, not been without ſome effect: and they have incited a deſign to ſerve the public ſtill further in this matter, by other means, that are now in agitation.

The *purifying* ONYXES *and* CORNELIANS, was, alſo, made an object of the Society's premiums in the chemical claſs. It had been obſerved, that the onyxes and cornelians, obtained here at preſent, were much more cloudy, in general, than thoſe tranſmitted to us from the ancients, among their engraven gems. This gave riſe to a notion, that the ancients were poſſeſt of a method of purifying, and rendering them clear: and an eminent German engraver of gems, at that time in England, maintained the ſame opinion. The Society, therefore, at the ſollicitation of ſome members, who were zealous ſupporters of the polite arts, offered the following premium, in 1760. "There being great reaſon to believe, that a method may be diſcovered of purifying cloudy onyxes and cornelians, it is propoſed to give to any perſon, who ſhall diſcover a method for that purpoſe, and ſhall produce three onyxes, and three cornelians, whoſe ſhorteſt diameter ſhall not be leſs than half an inch, the ſtones to be ſeen, approved of, and marked by the Society, before the operation, twenty pounds. It is expected that the ſtones be not injured by the operation, in any reſpect; and that the ſtones, to which the premium is adjudged, remain with the Society one month after the determination." In 1761, the premium was augmented to thirty pounds: and only two ſtones of each kind were required to be produced. In 1762, it was further increaſed to fifty pounds: in which manner it was continued to 1765; when it was dropt.

Though this premium was advertiſed for ſo long a time, it was never claimed: nor any application to become a candidate made, even by any pretender to ſuch an art: and there is the greateſt reaſon

ſon to believe, the ſame would have happened, had it continued much longer. For, notwithſtanding the opinion of the German artiſt, and others, nothing can be more improbable, than that the taking away the clouds from gems ſhould be practicable. The clearneſs of the antique onyxes and cornelians, on which all the preſumption reſted, that ſuch a method had been formerly practiſed, may be obviouſly accounted for, without any ſuppoſition of their being rendered ſo by art. It is well known, that the oriental ſtones, of this kind are, at preſent, much clearer than thoſe obtained by us in Europe for common purpoſes. And, as there are grounds to believe, they were plentiful with the Greeks and Romans, it is reaſonable to ſuppoſe, the ableſt artiſts among them, whoſe works only are in general tranſmitted to us, ſelected ſuch as were clear. This is a ſufficient anſwer to that argument for this opinion. But, when we conſider, that the foulneſs is owing, either to heterogeneous particles intermixt with the proper matter of the ſtones, or to imperfect cryſtallization; on what principle can we imagine, a change may be made throughout the whole ſubſtance of the ſtone in its ſolid and intire ſtate: and the fluxing it would entirely change the texture, and indeed the nature of the ſtone, by rendering it vitreous. Such an art, moreover, were it attainable, would not require the incitement of the Society's premiums for its diſcovery. Since the ſame principles would certainly extend to diamonds, and other gems of high price: the removing clouds from which would be the moſt advantageous operation, next to making them, or gold, that could poſſibly be practiſed. The Society, on reconſideration of this matter, having ſufficiently indulged the gentlemen who

who propoſed it; and who well merited this mark of their deference; have now dropt the premium.

The *making* LEAF METAL *and* BRONZE *in England*, was thought, alſo, a fit object of the Society's encouragement. They are not articles of very great return in trade: but as a quantity not wholly inconſiderable is uſed, and purchaſed of foreigners; and there appears no reaſon why it might not be made here; the Society were induced to offer ſome encouragement for a trial. In 1761 they advertiſed the following premiums: "For the "greateſt quantity of leaf metal and bronze, equal "to that imported, not leſs than three thouſand "packets of each, to be made at one manufactory "in England or Wales, fifty pounds." The Society very properly judged, that the quantity they required was much too large to be produced in the infancy of a manufacture of this kind; and, therefore, offered, the ſame year, another premium of twenty-five pounds, "for the greateſt quantity of "leaf metal and bronze, equal to that imported, "not leſs than one thouſand five hundred packets "of each, made at one manufactory in England "or Wales." The next year, they continued to offer fifty pounds as a firſt, and twenty-five pounds as a ſecond premium. In 1763, finding theſe meaſures fail, they reduced the ſums and quantity; and propoſed to give twenty pounds for not leſs than five hundred packets of each; and ten pounds for not leſs than three hundred packets. In 1764, they again raiſed the ſum to fifty, and twenty-five pounds; and required only the ſame quantity to be produced as in the advertiſement of the laſt year. In 1765, theſe premiums were dropt: no candidates having ever preſented themſelves.

Whether the price of labour here does not admit

mit of theſe articles being made ſo cheaply as abroad, or whether no perſon, in proper circumſtances to undertake this matter, had a diſpoſition to it, does not appear: but the Society tried, by the moſt fair offers, to furniſh motives for an attempt; in which the premiums, if obtained, would have been a ſufficient indemnification againſt any loſs, that might have been otherwiſe incurred.

The *diſcovery of a method of making good* PIG *or* CAST IRON, *with* COAK; *and of converting* PIG IRON, *ſo made, into good* BAR IRON; was another object of the Society's premiums. The attainment of the matter propoſed would be of the greateſt conſequence to our hardware manufactures; and make a very great ſaving of the money, we now pay to Sweden for iron, where a ſuperior kind is wanted; particularly the whole that is converted to ſteel. The reaſon, why we do not produce more perfect iron in our works, is, the ſcarcity of wood for charcoal, without a great conſumption of which, the iron produced at the foundry cannot be purified at the forge, to the ſtandard of the Swediſh, by any method at preſent known. Attempts have been, however, made to ſubſtitute coak, or in other words pit-coal charred, for the charcoal of wood: as the cheapneſs of that ſpecies of fuel, if it could be effectually applied to this purpoſe, would give us the advantage over all foreigners. Theſe attempts have been ſo far attended with ſucceſs, as to make a coarſer kind of pig iron, fit for ſome uſes: but not ſuch as is convertible with the quantity of charcoal, that can be allowed, without great loſs, into good forged or malleable iron. Much leſs is it at preſent known, how to convert pig iron, made with coak, into good bar or forged iron, by means of coak. The matter does not, nevertheleſs, appear

pear impoſſible: and the Society were induced, from this view of the facts, to propoſe the following premiums in 1762. "For making the largeſt "quantity of pig iron, not leſs than one hundred "tons, with coak, equally good with that made "with wood charcoal, fit for being manufactured "into rough bar iron; and which bar iron may "be ſold on the ſame terms as the Swediſh; one "hundred and fifty pounds.

"For making the greateſt quantity, not leſs "than ten tons, of tough bar iron, with coak, "from coak pigs, equal in goodneſs to that made "from pigs ſmelted by wood charcoal, one hun-"dred and fifty pounds." Theſe advertiſements were continued without alteration to the year 1766: when they were dropt.

Theſe premiums were never claimed: nor is it likely they ever ſhould, even if they had been kept on foot much longer: as we are very diſtant from this degree of perfection in the art of producing good malleable iron with coak; or indeed from being poſſeſt of the knowledge of any adequate principles, that lead to it. The Society, therefore, on a reviſion of the ſubject, diſcontinued the advertiſements: and with ſtill more reaſon, ſince the object was of ſo much importance to any, who were in a ſituation to attempt the attaining it, as well as to the public, that the premium could not be ſuppoſed to add to the motives for the purſuit. None but the proprietors of conſiderable works could poſſibly perform what was required to be done; and they have infinitely greater inducements than the ſum offered, to poſſeſs themſelves of the means, if they were within their reach. Moreover, the notion of this kind of improvement in the production of iron, is, at preſent, ſo generally diffuſed,

among

among all, who are engaged in ſuch concerns, that the Society's information of it could not be of equal avail, in this caſe, as it might in many others, where the matter is of a more obſcure nature, and the conception more novel.

The Society, alſo, ſet on foot the attempt to *diſcover* ARCHAL, or, as it is called in their liſt of premiums, *the* ORCHILLA WEED, *in England*. This is a moſs, brought from the Canaries, and Cape de Verd iſlands, of great uſe in dying. The conſumption was very conſiderable: and, at the time of offering the premium, the price was advancing here to a very high rate. The Society, therefore, thought proper, in 1762, to iſſue the following advertiſement, to encourage the reſearch after the herb here.

"To any perſon, who ſhall produce to the So-
"ciety, the greateſt quantity, not leſs than one
"hundred pounds weight, of orchilla weed, or
"moſs, ſuch as is brought from the Canaries, of
"the growth of any of his majeſty's dominions, fit
"to be manufactured into the material for dying,
"called archal, the ſum of one hundred pounds.

"Likewiſe, for any quantity, not leſs than fif-
"ty pounds weight, fifty pounds."

The advertiſements were continued to the year 1765: and then the whole was dropt.

This premium was never regularly claimed: and indeed there ſeems to be little probability it ſhould. Since the Society required the finding out the ſame kind of moſs here, as is brought from the Canaries, under the name of archal, or orchilla: which there is reaſon to believe, is not a ſpecies of moſs, that grows in theſe more northern latitudes. The end of the Society was, nevertheleſs, anſwered by the advertiſement. For, though

this particular ſpecies of moſs has not been diſcovered in England, another, which ſerves in a great degree for the ſame purpoſes, was found out; and is now brought into uſe. The public, therefore, owe to the Society, the introduction of an Engliſh material, inſtead of a foreign one, for which we payed annually a very large ſum, that is in part ſaved now: and we may hope will be ſo entirely in time.

But the reſearch, which the Society have incited after tinging moſſes, will moſt likely have many more beneficial conſequences. Great numbers of the ſpecies of this kind of vegetable afford dyes; and, on due trial, ſuch as are very valuable will moſt probably be found. In the manufacture of plaids in the Highlands of Scotland, which great number of families go completely through, without any exterior aſſiſtance, the dying the various colours is performed in the common culinary veſſels, by a traditional art, which the people poſſeſs in common. It is well known, that ſome of the principal ingredients, in their dyes, are moſſes; of which the particular ſpecies are not known to us: though, probably, from their ſtrength of colour, and faſtneſs, they would afford great improvements to our dying woollen ſtuffs.

A particular proof of this has already occurred in thoſe parts, in the inſtance of the CUDBEARE. This is one of the ſpecies of the tinging moſſes: whether freſhly diſcovered, or whether one of thoſe uſed in the dying the Highland plaids, I have not been able to diſcover. But ſome gentlemen procured it to be collected, and prepared it in the form of a pigment: in which ſtate, it was ſucceſsfully produced to ſale as a dying drug. Applications were made to the Society, to give a judgment

on

on its merits: and, after repeated cautious trials comparatively with archal, the Society reſolved, on the authority of the moſt able dyers, that tho' it would not anſwer all the purpoſes of archal, yet it would for ſome, even with a ſuperior excellence. This undertaking to make cudbeare returned in a ſhort time ſeveral thouſand pounds: and employed a number of indigent women and children, in collecting the moſs, in a part of the country where it was of the greateſt benefit. The further examination of moſſes, in different parts of Great Britain, therefore, merits great attention: and, though the Society diſcontinued the advertiſements for the premium, on finding a large work ſet on foot of archal prepared from Engliſh moſs: yet it is hoped, the attention to the ſubject will not be dropt by thoſe, who are qualified properly to make reſearches of this kind.

The diſcovery of *a true* RED COLOUR *for the uſe of* ENAMEL PAINTERS, was deemed, likewiſe, a proper object of the Society's encouragement. The red produced from gold is the only bright colour, of that kind, yet known: and it verges too much on the purple for many purpoſes. It has indeed been ſaid, on good authority, that a fine crimſon, and even a teint tending to the vermillion, has been produced by the ſame means. But this ſeems to be ſo much the reſult of accidental circumſtances in the proceſs, that it has been extremely rare. The Society, therefore, in conſideration of the great utility of a true bright red colour to enamel painters, and of the reaſon to believe it was attainable, offered the following premium.

"To the perſon, who ſhall make the fineſt "ſcarlet colour, which will bear repeated and ſufficiently

" ficiently ſtrong fires, without change, for the " uſe of enamel painters; the quantity to be pro- " duced not leſs than two ounces; from which " quarter of an ounce will be taken for trials, the " remainder to be ſealed up and returned to the " candidate; fifty pounds." This premium was advertiſed the two ſucceeding years, with this alteration, that the words *true red* were ſubſtituted in the room of the word *ſcarlet*. In 1766, the premium was dropt: and it does not appear to have been ever given.

The Society thought proper, alſo, to offer encouragement to the eſtabliſhing a work for *making* SALT *in England, that would anſwer the purpoſes of the foreign* BAY-SALT. This kind of ſalt, called bay-ſalt, is neceſſary for curing fiſh, as well as pickling beef or pork, in ſome of the methods now in common uſe: and it is purchaſed of other countries. It had been demonſtrated, by the experiments of Dr. Brownrigg, and others, that, by a proper method of preparation, eaſily practicable, our ſea-ſalt might be rendered an effectual ſubſtitute. The Society, therefore, in order to engage perſons, who might conveniently make quantities of ſuch ſalt, to undertake it, offered, in the year 1764, the following premium. " For the great- " eſt quantity of ſalt, not leſs than twenty tons, " made in England or Wales, which will anſwer " the purpoſes of bay-ſalt, the ſame being made " at one manufactory, not erected before the end " of the year 1763, one hundred pounds.

" For the next greateſt quantity, not leſs than " fifteen tons, on the ſame conditions, fifty " pounds."

" N. B. The method of making bay-ſalt, and " the practicability of doing it to advantage in " England,

" England, may be ſeen in Dr. Brownrigg's trea-
" tiſe on that ſubject."

This advertiſement was diſcontinued the next year.

The premium was never claimed: probably from the ſhort time of its continuance. For, in the caſe of large manufactures, or conſiderable works of this nature, time is required to the ſettling and executing a proper plan. The views of the Society have, however, been anſwered in the ſequel, in conſequence of their having propagated the notion of the advantage of ſuch an undertaking. For a large manufactory is now ſet on foot in Eſſex: where, in all probability, the whole demanded for our conſumption will be ſupplied; and the expence we before incurred, will be ſaved to the public.

Beſides theſe improvements in the chemical arts, or the manufactures or trades dependant on them, for which the Society advertiſed rewards, there were ſome others, that were voluntarily brought before them, which they encouraged in the way of bounty; or procured to be laid open in the way of purchaſe.

One of theſe was, the STAINING *of* MARBLE, *ſo as to give it the appearance of* INLAYING. The perſon who applied on this ſcore to the Society, had carried that art to great perfection; and could employ a variety of colours in painting arms, flowers, figures, and other objects. On producing ſpecimens of his performance in the year 1759, a bounty of ten pounds was given to him.

Notwithſtanding the Society's encouragement, and the perfection to which this art has been advanced, there has been but little done in it ſince; moſt probably, from the very high price ſet upon the reſpective performances in the application of it:

which has deterred even ſome of the moſt liberal and expenſive patrons of works of this kind, from purchaſing them freely, as they were otherwiſe diſpoſed to have done.

The *revealing a method of* TANNING *with* OAKEN SAW-DUST, which had been lately diſcovered, was a more important object of the Society's efforts to promote the commercial intereſt of Great Britain. The inventor of this method, who was an ingenious mechanic, but not in affluent circumſtances, offered to lay open his art, for the benefit of the public, if the Society would allow him a conſideration for it. They cloſed with his propoſal; and agreed to pay the expences of his coming to, and living in, London, while he tanned proper ſpecimens of the leather, under their inſpection; and to give him a hundred pounds, on condition he made good his pretenſions in theſe trials. He accordingly came, and began the experiment; but was taken ill of the ſmall-pox, which occaſioned a delay. The Society had, however, the generoſity to ſupport him in his illneſs, at a conſiderable additional expence: and after his recovery, he completed his proceſs. The Society then, on the authority of ſeveral principal members of the leather-dreſſer's company, who examined the leather tanned with ſaw-duſt only, under the inſpection of a committee, reſolved, that he was intitled to the hundred pounds according to the agreement.

The Society thus procured to the public, the knowledge, and right, as far as regarded the property of the invention, to practiſe a much cheaper method of tanning than with bark. But, unluckily, this acquiſition has not had hitherto its deſired effect. There is, unhappily, an old act of parliament, which prohibits the uſe of any ſubſtances for

for tanning, beſides ſuch as are ſpecially enumerated there: and in that liſt of ingredients, ſaw-duſt has no place. An attempt was, however, made to procure a repeal of this prohibition. But the reaſons for the expedience of ſuch a meaſure, not being well explained, it miſcarried. The reſtraint which this act lays, is certainly, nevertheleſs, a great check and injury to a very important branch of trade. And there can be no ſhadow of argument alledged, why a dear ingredient ſhould be uſed in tanning, inſtead of a cheap one, that would anſwer equally well; except what regards the intereſt of the proprietors of woods: who might find ſome diſadvantage, in being deprived of the means of diſpoſing of their bark for this purpoſe. But that is a very trivial conſideration, compared to the benefit we may gain, or loſs we may ſuffer, by any improvement or detriment to our trade in leather. This trade was, ſome time ago, very extenſive, both in the manufactured articles, and the intire ſkins: as we not only ſupplied our own colonies, but a conſiderable part of Europe. But we are now loſing it in every quarter. The art of tanning is introduced lately into Sweden, by an Engliſhman: and is practiſed for the ſupply of that country: which is thence, according to the prevailing notion there, thus furniſhed with as good, if not better, than they before obtained of us. A diſtinguiſhed monarch in Germany, particularly attentive to commercial, as well as military concerns, is eſtabliſhing the practice of tanning in his dominions, by adopting this very diſcovery of the uſe of oaken ſaw-duſt in it. It, therefore, behoves us to authorize and employ every means of tanning in the moſt perfect and cheap manner, that we may not loſe ſtill more of our foreign trade for leather,

or the articles made of it. But no legal meaſures can be taken to keep us on a footing with our rivals, while we are ſubject to the prohibition of the uſe of better and cheaper ingredients than bark, or thoſe now tolerated; and of the ſhortning the time of the leather's remaining in the tan: which is, alſo, forbid, by another clauſe in the ſame act, that directs it to be kept in the tan, ſix or ſeven times as long as is neceſſary, according to ſome improved proceſſes lately diſcovered. The dearneſs of leather for ſhoes, which is a grievance to the poorer people, calls aloud, alſo, for the introduction of all thoſe methods, that may render it cheaper. The conſequences, therefore, of theſe improvements, or reſtraints, are infinitely greater to the community, than the promoting or diminiſhing the ſale of bark: and there is, moreover, a very material reaſon, on another principle, why that ſhould be diſcouraged, inſtead of promoted. The profit ariſing from it, induces the proprietors to fell timber at that ſeaſon of the year, which is unfavorable to the ſtrength and durability of the wood: by which means thoſe who have occaſion to employ it, are worſe ſerved with timber than they otherwiſe would be, and our buildings greatly injured, by the ſhrinking and contraction ſo conſtantly found where new timber is employed. It is hoped, theſe reaſons will weigh with ſome public-ſpirited members, to amend a law, which might, as it now ſtands, be conſiſtent with the policy of former times, but is greatly repugnant to that of the preſent. Whenever this is done, the public will receive very great advantages from thoſe improvements in tanning, which the Society's encouragement has produced.

The Society were, alſo, induced, in the year 1767,

1767, to give a bounty for the *improvement of* CRAYONS. The art of making of paſtils, or crayons, was by no means brought to the degree of perfection here, of which it admits; and thoſe commonly to be obtained were faulty or defective. On the producing ſpecimens by the candidate for this bounty, to the Society, he informed them, that there were no crayons to be purchaſed, which could be eſteemed perfect, except of Mr. Stoopan, of Lauſanne in Switzerland: but that he could furniſh them with equally good, much cheaper; and would ſell a ſingle crayon to any artiſt who deſired it: whereas the others were not to be bought but in ſets. His ſpecimens were given to be tried by ſome able crayon painters; and were reported to be equal, if not ſuperior, to the beſt foreign. The Society, therefore, gave him a bounty of ten guineas.

Notwithſtanding this, and other private improvements of crayons, it is yet difficult to procure ſuch as are good: and, indeed, the ſame may be ſaid of all the finer pigments or colours uſed in painting. This is principally owing to the ignorance, or ſordidneſs of dealers in theſe articles, who ſometimes do not know how to judge of them, but more frequently reject ſuch as are more perfect, for the ſake of cheaper; whence the preparation of fine colours has been thrown into the hands of Jews, and the moſt illiterate low people; by which means, the art of making them is much depraved, comparatively to what it was formerly. It would be, therefore, greatly for the intereſt of painting, now carried to a great height of excellence in our country, as to other points, that a manufactory of fine colours, &c. ſhould be eſtabliſhed, under the direction of ſome perſon of judgment and honour,

on which, artiſts might depend for being ſupplied with ſuch colours as were perfect in their reſpective kinds, either through the hands of colourmen [illegible] if they would not furniſh them genuine, from the manufactory itſelf. This would prevent the frequent and great mortifications, which the moſt eminent artiſts of the preſent time have undergone, of ſeeing the beauty of their works quickly fade; and of ſuffering the reproaches and reflections of thoſe who have purchaſed them.

There was another article in this claſs, of very conſiderable importance, in which the Society exerted their endeavours to ſerve the public. It was the procuring to be laid open *the art of* DYING LEATHER RED *and* YELLOW, *as practiſed in the* EAST, *for that kind called* TURKY LEATHER. The ſecret of theſe methods was brought over by an Aſiatic, who firſt came to England on ſome buſineſs, ſeven or eight years ago. Having received great civilities in our country, he was prevailed upon by two gentlemen, who were zealous members of the Society, to try, on his return to the Eaſt, to make himſelf maſter of this and ſome other arts not known here, in order to communicate them, by means of the Society, in caſe he ſhould again come to England. He performed this accordingly: and brought with him, not only the proceſs for dying the Turky red and yellow leather, but a proper quantity of the ingredients, for ſhewing the effects of it to the Society. Some circumſtances prevented this being done at that time: but, on a ſecond return hither, the matter was propoſed to the Society, who agreed to give him one hundred pounds, as a reimburſement of the expence he had incurred in obtaining the ſecret of this art.

In

In purſuance of this agreement, the recipes for both dyes were delivered by him to the Society; and the proceſſes were performed before a committee, on ſeveral ſkins. The Society then came to the following reſolutions, with reſpect to his performance of what he had taken upon him.

" That the ſkins, dyed by Mr. Phillippo, are " of a beautiful colour; equal to the beſt foreign " ſkins, commonly imported; and being compared " with the Turky appear ſuperior to them: That " Mr. Phillippo has revealed the manner of dy- " ing red and yellow Turky leather; and per- " formed the principal operations, before a com- " mittee, to their ſatisfaction: and is, therefore, " intitled to the ſum of one hundred pounds, " according to the agreement made by the So- " ciety with him."

After this, it appearing from facts, there was no reaſon to doubt, that he had not been a gainer by the bringing over theſe ſecrets; which he had acquired with great trouble, and at an expence equal to the ſum he had received from the Society; and, alſo, on unqueſtionable teſtimony, that he refuſed a much greater premium, which had been offered him to reveal them to private perſons for their uſe, inſtead of laying them open according to his propoſals; the Society came to the following reſolution, to preſent him with a gold medal.

" That Mr. Phillippo having performed his " agreement with the Society, to their ſatisfaction; " the colour of the leather, dyed by him, being " ſuperior to that of the foreign brought hither; " and the ſum, paid to him by the Society, being " ſcarcely more than a reimburſement of his ex- " pence, and much leſs than he could have gained, " by ſelling the ſecret to private perſons; in con-

" ſideration of the great benefit his revealing this " ſecret to the Society, may be to the public; and " of his generous behaviour; the gold medal of " this Society be preſented to him."

The proceſſes for dying the Turky red and yellow, thus obtained by the Society, are, together with ſome notes, added to explain the nature of two of the principal ingredients, unknown here, and the means of procuring them, inſerted below in this volume, at their requeſt. They will undoubtedly be of very material benefit to the public: as they teach the method of dying leather of theſe colours, in a manner ſuperior to that uſually imported here, under the name of Turky leather. The conſumption of this kind of leather, particularly the red, in book binding and other purpoſes, is very conſiderable; and we have for ſome time had the greateſt part of what we uſe from Liſbon. It appears, from a computation, founded on the cleareſt ſtate of facts, that we can produce the ſame here, dyed in this manner, at a much lower price than we now purchaſe it at from thence. There is one large manufactory of it ſet on foot already: and others will certainly be eſtabliſhed as ſoon as the proceſs is made public; and the ingredients, abovementioned, can be procured in due quantity: which is a matter of no difficulty: as they are to be purchaſed very cheaply at Aleppo, Smyrna, Gallipoli, or any other ports in that part of the world. The public are, therefore, greatly indebted to the Society for the acquiſition of this art, of producing among ourſelves a commodity, we before purchaſed of foreigners to a great amount; and which, by being rendered much cheaper here, may be applied to many uſes in furniture, and other purpoſes, where it will add to the national elegance.

SECT.

SECT. VI.

Of Improvements relating to our Trade with the Britiſh Colonies.

THE increaſe of trade with our colonies, on ſuch foundation, as leads to their taking manufactures, or other profitable commodities from us; and making a due return in what we want, where the balance in money is defective; is of the utmoſt conſequence to both parts of the community. The promoting, therefore, in the colonies, the introduction or progreſs of ſuch arts, or culture, as may afford the articles proper for our importation, muſt conduce to this end; and, conſequently, falls ſtrictly within the views of the Society. They have, accordingly, made very ſtrong and ſucceſsful efforts, to tranſmit to the colonies the intimation of ſuch matters, of a more obſcure nature, as promiſed to yield theſe advantages; as well as the knowledge in ſome inſtances of the means of attaining them; and to encourage, by the offer of rewards, the purſuit, not only of thoſe, but of others, that were more generally known, but not yet eſtabliſhed in any effectual manner.

Among theſe, one of the firſt objects was *the production of* SILK *in the* AMERICAN COLONIES. The importance of producing ſilk in our own dominions has been before touched upon: and, indeed, requires little elucidation. This matter had been begun already in Georgia: but the Society both ſtrove to add to the encouragement of its progreſs there, and to the extenſion of it to other colonies.

With theſe views, they firſt offered, in 1755, the

the following premium for the planting mulberry trees in Georgia, with a view to the providing food for ſilk-worms.

" To the perſon, who ſhall plant, and properly fence, the greateſt number of white mulberry trees, on his own plantation, in the province of Georgia, ten pounds ſterling.

" For the ſecond greateſt number, five pounds.

" For the third greateſt number, three pounds."

In 1756, theſe premiums were again offered for Georgia; and the Society, alſo, propoſed to give the ſame for the cultivation of mulberry-trees in Carolina. The next year theſe premiums were dropt, in order to make room for others, which the Society imagined would have more influence with thoſe, on whom the production of ſilk there depended. However, the premiums for both thoſe provinces were claimed, and allowed the firſt year they were offered.

In 1757, a premium for the ſilk itſelf, was ſubſtituted in the place of that for mulberry-trees; and advertiſed in the following manner: " The " production of ſilk in our American colonies, " being undoubtedly a proper object of encouragement, as it muſt tend greatly to the advantage " of thoſe colonies, and prove highly beneficial to " the mother-country, by promoting a very valuable branch of its manufactures; in order to " forward the ſame, by ſuch bounties, as may " operate in equal proportion, to the benefit of " the pooreſt, as well as of the richeſt planter; " the Society propoſe to give, for every pound " weight of cocoons, produced in the province of " Georgia, in the year 1757, of a hard, weighty, " and good ſubſtance, wherein one worm has only " ſpun, three-pence.

" For

" For every pound of cocoons, produced in the " ſame year, of a weaker, lighter, ſpotted or " bruiſed quality, though one worm has only ſpun " in them, two-pence."

" For every pound of cocoons, produced in the " ſame year, wherein two worms have interwoven " themſelves, one penny."

Theſe premiums were continued the next year: and, at the ſame time, the Society, to promote as much as lay in their power the production of ſilk in the colonies, propoſed the ſame premiums for two other provinces, Connecticut and Penſylvania.

In 1759, the ſame premiums for ſilk in Georgia were again offered. But thoſe for Connecticut and Penſylvania were changed: and the province of North Carolina was alſo admitted to receive the ſame benefit from them as thoſe other colonies. The Society offered then, " for every pound weight of " merchantable raw ſilk, raiſed, and produced in " the colonies of Connecticut, Penſylvania, and " North Carolina, in the year 1760, two ſhillings " and ſixpence."

And, " Whereas the object and intention of the " Society, in giving the abovementioned premi- " ums, were to encourage, as far as in them lay, " the importation into this country, from our own " colonies, of this very valuable material of manu- " facture, which was then imported, at a great ex- " pence, from foreign nations; in order to promote " that end, for the mutual benefit of the mother- " country and the colonies, the Society agreed to " give a further premium of one ſhilling, for every " pound weight of raw ſilk, imported into Eng- " land, from the ſaid colonies of Connecticut, " Penſylvania, and North Carolina." All theſe premiums were continued to be advertiſed to the

year

year 1762. Another additional one was then reſolved upon for this article. It was, "For the "greateſt quantity of good merchantable raw ſilk, "not leſs than one hundred pounds weight, pro- "duced in any of the Britiſh American colonies, "and imported into the port of London, one "hundred pounds; but Georgia, South Carolina, "North Carolina, Connecticut, and Penſylvania, "are excepted, thoſe colonies having a particular "premium.

"For the next greateſt quantity, not leſs than "fifty pounds weight, fifty pounds.

In 1763, the premiums for ſilk cocoons in Georgia were again offered: and the ſame, alſo, were propoſed to be given for them in South Carolina. Thoſe for the producing raw ſilk in Connecticut, Penſylvania, and North Carolina, were likewiſe continued. But the premium for the importation of ſilk from thoſe colonies was dropt, to make way for the continuance of thoſe offered for the importation of ſilk from any of the Britiſh American colonies, under the ſame reſtriction as when firſt advertiſed in 1762. In 1764, the premiums, as they ſtood the preceding year, were again propoſed to be given, and were continued to the year 1766; when thoſe of one hundred pounds, and of fifty pounds, for importing ſilk from any of the Britiſh American colonies were dropt. But thoſe for ſilk cocoons in South Carolina and Georgia; and for raw ſilk in Connecticut, Penſylvania, and North Carolina, were not diſcontinued till 1767.

In 1759, claims were made by ſeveral candidates for the premiums, to the amount of eighty-ſeven pounds, for producing ſilk cocoons in Georgia, and allowed. They were again adjudged in 1760,

to

to various candidates, to the amount of one hundred and thirty pounds: alſo in 1761, to the amount of one hundred pounds: and in 1762, to the amount of ſixty-five pounds. In 1763, the premiums were again allowed to many claimants for ſilk cocoons in Georgia, both of the beſt and inferior kinds: in all to the amount of one hundred and eighty-eight pounds. In 1764 there were ſeveral candidates, whoſe claims appeared to be, as well for the premiums for Georgia as South Carolina: and theſe alſo were allowed, to the amount of one hundred and ninety-three pounds. In 1765, a ſlight attempt ſeems to have been made, to produce ſilk in Connecticut, by the premiums paid to candidates there: which were, however, not more than eight ſhillings and nine-pence. But one hundred and ninety pounds were paid the ſame year for the claims in Georgia. In 1766 there were again many candidates for the premiums for producing ſilk in Georgia and South Carolina: to whom, they were allowed, to the amount of one hundred and fifty-five pounds: and, alſo, in 1767, to the amount of two hundred and fifty-four pounds.

It appears hence, that ſlow advances have been made in the production of ſilk in our American colonies, notwithſtanding the ſanguine hopes, which were entertained at firſt of it. The government thought the proſpect ſo promiſing of national advantage, as to give a conſiderable bounty; and to eſtabliſh a public filature in Georgia. The Society ſeconded the views of government; and generouſly added their mite. But yet no adequate fruits of their joint encouragement have been reaped: nor will that appear ſtrange, when we conſider minutely the circumſtances on which this matter depends. To produce a great quantity of ſilk, a great

great number of hands muſt be employed. They can only be employed in that work a part of the year: and the return of their labour will fall far ſhort of being a maintenance to them for the reſt. It is only the ſpare hands, therefore, ſuch as women and children, in the families of labouring people, who derive their principal ſupport from ſome other ſource, that can carry on this buſineſs: and there is only a ſmall number of ſuch in a young colony; or, indeed, in any colony. The production of ſilk, conſequently, not being a proviſion for families, will never draw people to a new place: and if any were ſettled with that view, they would in time quit it. For the gain is ſo limited, as the undertaking cannot be inlarged, but by the addition of freſh hands, which cannot be retained for this purpoſe ſolely, that whenever the people get into tolerable circumſtances, they will turn their application to ſomething better. We ſee accordingly, that ſince the Society have given premiums for this matter, it declined for ſeveral years, till the laſt, in Georgia, though the colony itſelf increaſed: and it roſe in a little ſettlement in Carolina, where there were ſome new people, who had not ſimilar opportunities of more advantageous undertakings. Some attempts have been lately made to carry over to Florida, a number of people from the eaſtern part of Europe, who were accuſtomed to the production of ſilk: and ſeveral French have been ſent to Carolina with the ſame deſign. If employment in ſome other way can be found for them, the part of the year they are not engaged in this work, they may be kept to ſuch an undertaking; and poſſibly induce others of their countrymen, who are diſtreſt at home, to join them. But great progreſs can never be made in this article, where there are but few people:

or where the labour of thoſe employed will bear a conſiderable rate, if applied to other work. The production of ſilk is, therefore, much fitter for a populous country, where there are great numbers of women and children, who have no employment; and to whom, conſequently, every opportunity of earning ſomewhat is a matter of gain worth their regard. Theſe circumſtances ſeem to render the production of ſilk much more ſuitable to Great Britain than the colonies, as we have above had occaſion to obſerve: and the Society, having nobly contributed one thouſand three hundred and ſeventy pounds towards the eſtabliſhment of it in the latter, have now begun to encourage, by various proper means, the trials in the former: where, if ſucceſs ſhould follow their endeavours, it would be of exceeding great ſervice, as well in a political as commercial light. As it would ſave vaſt ſums to the public, give bread to the neceſſitous, and find work for the idle: without taking off the hands from our preſent manufactures, or from huſbandry.

The *production of* WINE *in the American colonies*, was another great object, that falls in this claſs, which the Society early adopted. Several attempts had been made, without ſucceſs, to introduce the vines of the Eaſtern continent into our American colonies, in order to the making wine: and a governor of Georgia, in particular, had been fruitleſly at conſiderable pains and expence on this account, there. The Society, however, deeming it not impracticable, and urged by the importance of the view, entered with great ſpirit into the deſign of encouraging it: and have purſued their intention by the offer of various premiums.

They firſt, in the year 1758, propoſed the following

lowing premium for the wine itſelf. "As pro-
"ducing wines in our American colonies will be
"of great advantage to thoſe colonies, and alſo
"to this kingdom; it is propoſed to give to that
"planter, in any of our ſaid colonies, who ſhall
"firſt produce, within ſeven years from the date
"hereof, from his own plantation, five tons of
"white, or red wine, made of grapes, the pro-
"duce of the colonies only, and ſuch as, in the
"opinion of competent judges, appointed by the
"Society in London, ſhall be deemed deſerving
"the reward; not leſs than one ton thereof to be
"imported at London; one hundred pounds."
This premium was continued to be advertiſed to 1765, the period appointed for the bringing in the claims, and then dropt. After the year 1759, a *nota bene* was added to the advertiſement, which expreſſed, "that the method of cultivating vines for wines, and "the manner of making wines in different coun-"tries, were to be found in *Miller's Dictionary*, "Edit. 1758." During the time this premium was offered, others, for the raiſing vines for wines, were alſo propoſed to be given. The Society very properly imagined, that the firſt ſtep towards eſtabliſhing a matter of this kind was, to incite numbers, by large rewards, to undertake the planting ſuch vines as are beſt for the production of good wine. This was certainly neceſſary, before the other premiums for wines could have any effect. The Society, therefore, in 1762, publiſhed the following advertiſement. "A premium of two "hundred pounds will be given for the greateſt "number, not leſs than five hundred, of the "plants of the vines, which produce thoſe ſorts "of wines now conſumed in Great Britain, which "ſhall have been properly planted, and effectually fenced,

" fenced, ſecured, and cultivated within any of " the Britiſh colonies upon the continent of North " America, to the northward of the river Delawar, " conſidered as one diſtrict, between the 1ſt of " 1767, and the 1ſt of April 1767: and fifty " pounds for the next greateſt quantity, not leſs " than one hundred plants."

The like premiums were ſeparately offered " for " any of the Britiſh colonies on the continent of " North America, to the ſouthward of the river " Delawar."

And the ſame was alſo propoſed " to the Ber- " muda iſlands."

To theſe advertiſements, was ſubjoined a *nota bene*, declaring, that " the perſon who ſhould be " entitled to the premium for making five tons of " wine, as publiſhed in the liſt of premiums, in " 1761, ſhould not be intitled to theſe premiums."

In 1763, the Society thought proper to continue the premium for the planting vines in the colonies to the ſouthward of the river Delawar, and the Bermuda iſlands, to the year 1768. In 1765, they alſo propoſed to give additional premiums of two hundred pounds, and fifty pounds, under the like limitations, for the planting the ſame quantity of vines, actually producing the grapes, which yield thoſe ſorts of wines now conſumed in Great Britain, between the 1ſt of April 1768, and 1ſt of March 1770. Theſe they extended to the three ſeveral diſtricts, as in the former premium of 1762.

Theſe premiums have not been extended ſince the time mentioned; becauſe the introduction of vines into America is known, by the Society, to have taken place.

The firſt account of the ſucceſs of theſe

premiums was in 1763; when Mr. Carter ſent a dozen bottles of two kinds of wine, from grapes which grew in vineyards of his own planting in Virginia. The one of theſe kinds was the product of vines brought from Europe; the other of the American wild vines. They were both approved as good wines: and the Society gave their gold medal to Mr. Carter, as the firſt, who had made a ſpirited attempt towards the accompliſhment of their views, reſpecting wine in America.

In 1767, there were claims made for the premiums on the planting vines, both from the diſtricts to the ſouthward and northward of the river Delawar. But the form of certification of that to the ſouthward, not being conformable to the advertiſement, the claim was not allowed. There were two claims for that of the northward; but the claimant, who had planted the greateſt number of vines, having, alſo, failed in ſome eſſential points of certification, the premium was adjudged to the other. However, in conſideration of having planted ſo great a number of vines, as two thouſand one hundred, the Society thought fit to give him a gold medal.

Certificates for the eſtabliſhment of other claims have been again ſent over this preſent year, the determination of which is now depending.

The Society, therefore, at the expence of two hundred pounds, and two gold medals, beſides what they may pay on account of the claims now before them, and ſuch as may be made in the year 1770, have fully ſucceeded in their attempts, to introduce the cultivation of the European vines into America. It is dubious, nevertheleſs, from the preſent experience, how far this will lead to the production of wine there, as an article of commerce.

merce. For the vintage is found, in many parts, to be ſubject to ſuch very frequent miſcarriages, from the burſting of the grapes, cauſed by the rains, before they are ripe, as ſeems to take away a chance of profit from the product. But the Society's meaſures have occaſioned trials of the native vines of America, which were before only conſidered as wild uſeleſs plants, that promiſe much better ſucceſs: and the quality of the wine appears to be good, from the ſpecimen above mentioned to be ſent by Mr. Carter. There are ſuch authorities for that opinion, that the Society have this year offered their medals, as a premium for the cultivation of the indigenous native vines. The public will, therefore, in all probability, owe to their encouragement, the production of wine in North America: which had been before, without ſucceſs, attempted by ſeveral; and by ſome at a great expence.

The *importation of* MYRTLE WAX *into England*, was another early article, which the Society thought fit to encourage. The ſubſtance called by this name, is the production of a ſhrub, commonly termed the *candleberry myrtle*. This ſhrub is not, however, a myrtle, but has been named ſo, meerly from ſome reſemblance in the leaves and branches to thoſe of the myrtle. Nor is this product of it really wax, though that name has been given to it from the ſame principle: that is, a reſemblance in ſome qualities to wax. But it is, in fact, a concreted vegetable oil, moſt like in conſiſtence to the harder kinds of animal fat, but ſtill firmer; and of a dull green colour. It is procured by boiling the berries of the ſhrub, which originally contain it. The Society's endeavouring to bring over this ſubſtance, as a merchantable commodity

here, muſt only be conſidered as a trial of what might be done, with reſpect to the rendering it an article of commerce. For though it be uſed for making candles and ſope in America: yet its dull colour, faultineſs in not affording a clear light, and diſagreeable ſcent, render it objectionable as to that uſe: and the too great price ſeems to be an inſuperable impediment againſt its being applied to the making ſope here, though very ſuitable to it in other reſpects. There was, however, ſome notion prevailing, that this ſubſtance might be bleached; and made to anſwer the purpoſes of wax: and, the nature of it not being well underſtood, in general, the Society were induced to offer, in 1759, the following premiums. "Where-
"as myrtle wax, which has been hitherto import-
"ed in ſmall quantities only, has been found by
"experience, to make an excellent ſope, and when
"bleached, to anſwer the purpoſe of white wax:
"a premium of thirty pounds will be given for the
"greateſt quantity of myrtle wax, imported from
"any of the Britiſh colonies in America, not leſs
"than five hundred pounds weight at one impor-
"tation, into the port of London.

"For the ſecond greateſt quantity, not leſs than
"five hundred pounds weight, twenty pounds.

"For the third greateſt quantity, not leſs than
"five hundred pounds weight, ten pounds."

The next year the ſame advertiſements were continued: but in 1761 they were dropt.

Theſe premiums were claimed in 1761; and the firſt and ſecond allowed. But it then appeared that there was no vent for myrtle-wax here. The making ſope of it was not generally underſtood: and though it is an excellent material for ſome kinds, it was yet much too dear. For, notwithſtanding

withſtanding this, ſubſtance bore a moderate price in America, while the demand for it was ſmall; yet it roſe on being purchaſed to make up the quantities to gain the Society's premiums; and could not be brought hither, even at the price then paid, under ten pence a pound at leaſt: which was too much for the ſope-boilers to pay. As to making candles of it, the objection held ſtill ſtronger, as to the price, from its defective and faulty qualities: and the bleaching it was not only an undiſcovered matter, but ſavoured much of impracticability, in the opinion of thoſe, who are moſt intelligent in ſuch ſubjects. The Society, therefore, with great reaſon diſcontinued the premiums for this article: having given a fair opportunity, by occaſioning two very conſiderable quantities to be brought over, to thoſe, who could improve this ſubſtance, or employ it to any advantage. But it does not appear to have been ever applied to any profitable purpoſe here, but the ſophiſtication of plaſters in the manufacture of them, by ſome wholeſale dealers in medicinal preparations.

The *importation of* STURGEON *from our colonies*, was, likewiſe, another object of the Society's encouragement. The exceeding great quantity of this fiſh in the creeks and large rivers in the northern American colonies; and our purchaſing what we conſume at preſent from the northern parts of Europe; induced the Society to offer, in 1760, the following premium. "Sturgeon being found "in great abundance, in many of the rivers of "North America; it is propoſed to give a premi-"um of fifty pounds, to the perſon, who ſhall "import into the port of London, from any of the "Britiſh colonies in North America, the greateſt "quantity of ſturgeon, not leſs than one hundred

" kegs, containing five gallons each, equal in " goodneſs to the beſt imported from Dantzick." This advertiſement was continued to 1763; but then the Society reduced the number of kegs to fifty; and added a ſecond premium of twenty-five pounds, for thirty kegs. In this manner they were continued to 1766: but then were dropt.

There were ſeveral claims for this article. The firſt were in 1765, by two candidates: to whom the premiums of fifty and twenty-five pounds were adjudged. In 1766, the firſt premium was again given to another claimant.

The Society have, therefore, ſo far ſucceeded, as to procure the bringing over ſeveral conſiderable quantities of ſturgeon from North America. But it has not had the propoſed effect, of occaſioning our demand for this article to be ſupplied from the colonies. This is owing, partly to the difficulty of diſpoſing of conſiderable quantities, when brought over together; there being no regular trade for ſturgeon; but only ſmaller quantities brought, from time to time, by maſters or mates of veſſels, who ſupply the fiſh-mongers: and partly to the American ſturgeon's not appearing the ſame in flavour and colour with that uſually ſold. It was, nevertheleſs, perfectly good, after being kept ſome time in freſh pickle. But the warmth of the climate it undergoes, and the length of the paſſage, make it require that the pickle ſhould be originally ſtronger; or what is more effectual, that is, ſhould be renewed after the arrival of the ſturgeon here. By a proper attention to the treatment, there can be no doubt, but that the American ſturgeon may be made to reſemble exactly the European ſturgeon eaten here; as the fiſh itſelf is the ſame;

tame; and it may be brought hither at the proper ſeaſon with convenience.

The *production of* POT-ASH *in our American colonies*, was a very important purſuit, which the Society took upon them early to promote. The attainment of this was a matter of the utmoſt conſequence to the manufactures of Great Britain and Ireland; as well as to the colony intereſt: and, though ſome attempts had been made to it, there was at that time no proſpect of its being brought about, if the Society had not adminiſtered their effectual aid. It is proper, therefore, the public ſhould know in what degree, they owe the very great advantages, that may accrue from this acquiſition, to the munificent encouragement, and intelligent aſſiſtance of the Society: which have been the ſole means of eſtabliſhing a matter of ſo much moment, and ſo much difficulty. To judge, however, of the importance of this concern, and the neceſſity, as well as efficacy of the means employed by the Society, with reſpect to it, there is occaſion to premiſe ſome account of the nature of pot-aſh; and of our ſituation as to the procurement of it, before the American ſource of ſupply was opened.

Pot-aſh is an alkaline ſalt, of that kind called the vegetable alkali, obtainable from moſt vegetables, by burning or incineration. In the common ſort of pot-aſh, beſides the alkaline ſalt, there is contained a conſiderable proportion of calcined earth, or, in other words, of the aſhes of the vegetable, and generally ſome of the fixt ſulphur and burnt oil of the calcined plants. A purer kind, however, being neceſſary for many purpoſes, ſuch is accordingly prepared, by freeing it from the ſulphureous and earthy parts: and this is called

pearl-aſh. Before our obtaining any pot-aſh from America, we purchaſed of foreigners, principally for money, nearly the whole of what we conſumed of theſe commodities: which amounted to a national expence, according to ſome calculations, exceeding a hundred and fifty thouſand pound *per annum.* But what was ſtill more diſadvantageous to our affairs, the great increaſe of the conſumption of pearl-aſh, on account of bleaching, in the manufactures of linnen and cotton, as well as the printing them; together with the decreaſe of the production of pot-aſh and pearl-aſh abroad, from the failure of wood in the countries whence they were imported; was occaſioning the price of theſe commodities to riſe very high; and would have brought great embarraſſment on ſome of the moſt valuable of our manufactures, without a ſeaſonable ſupply. At the time the Society took up this matter, it was, therefore, become a very weighty object of national concern: and another accidental circumſtance rendered their undertaking it ſtill more meritorious. This was, that ſome attempts, made with the aſſiſtance of government, ſoon after met with ſuch miſcarriages, as would have produced an almoſt inſuperable diſcouragement to future trials, had not ſuch cheap and eaſy means been pointed out, as removed the prejudice againſt the practicability.

The firſt endeavour to eſtabliſh the manufacture of pot-aſh and pearl-aſh in America, was made by Mr. Stevens: who went thither with that deſign, about twenty-five years ago. He found great difficulties in preparing, by the proceſs uſed in Europe, ſuch kind of pot-aſh as was ſaleable here: and the produce, after freight, and all other contingent expences were defrayed, did not well anſwer,

ſwer, according to the price at which he could diſpoſe of it. He, therefore, applied himſelf to improve the proceſs; and, at length, invented a new method of making pot-aſh; which produced ſuch as was ſo perfectly good as to anſwer in bleaching, and other uſes, the purpoſes of pearl-aſh; and which, at the ſame time, afforded a larger produce. After ſetting on foot a work of this kind, he came to England; and made application to the government for an encouragement to the eſtabliſhing this manufacture in North America. The aſſiſtance he deſired, was a bounty upon the imported commodity, which was refuſed: but, on proving the goodneſs of his pot-aſh, and the importance of its uſe, he had three thouſand pounds granted him, as an aid to enable him to proceed: and he went to ſeveral of the colonies; and engaged with proper people to erect works. There was, nevertheleſs, one unhappy circumſtance attending his method, that entirely defeated all efforts to render it profitable to the undertakers, notwithſtanding the increaſe, and goodneſs of the product. There was required, for the due execution of his proceſs, an extreme great degree of heat, in order to fuſe the alkaline ſalt: and this heat, together with the fluxing power of the alkaline ſalt, preſently fuſed the furnace likewiſe; and cauſed the deſtruction of an expenſive apparatus; and a ruinous delay of the work, till a freſh one could be conſtructed. Mr. Stevens ſpared no pains to remedy this defect in his method, either by the choice of ſuch materials for building the furnaces, as might reſiſt the vitrifying power of the fire and ſalts; or ſuch fabrication as might regulate the heat. The utmoſt, however, he could effect, was to render them capable of undergoing the requiſite heat,

when

when he conducted the operations with the greateſt care and ſkill; but when they were left to the manāgement of others, the furnaces were ſoon deſtroyed: and, with them, generally, all the hopes and ſpirit of proceeding in the proprietors. Theſe events, in a ſhort time, put an end to the uſe of this method; and the manufacture of American pot-aſh, that depended on it.

Mr. Stevens deſerves, nevertheleſs, the applauſe of his countrymen, for his long exerciſed aſſiduity and fortitude, in purſuit of this object, notwithſtanding the moſt diſcouraging difficulties;—for his ingenuity, in diſcovering the abovementioned method of making pot-aſh, and the principle on which it depended, as it failed of ſucceſs, only from the defect of proper materials for building the furnaces;—and for having firſt engaged, by his negociations, in almoſt all our North American provinces, the attention of the inhabitants to this great concern; and prepared them, thence, to embrace and execute a more ſafe and eaſy method, when offered to them in a manner that removed their doubts of the practicability. He ought, in fact, to be conſidered as the firſt, and a very principal inſtrument of introducing this profitable article into our colonies; and was well intitled to what the government granted him: which I am afraid, from its being intirely applied to the proſecution of his deſigns, rather proved an ineffectual aid to them, than a reward, by being made an addition to his own fortune.

During the continuance of Mr. Stevens's attempts, the Society firſt determined on the encouragement of this matter. Not knowing, then, the impracticability of Mr. Stevens's method; nor, conſequently, the languiſhing ſtate of the attempts

to

to make pot-aſh in America; they offered, in 1758, the following premium.

"The money paid to foreigners for large quantities of pot-aſh, uſed in our manufactures, being very conſiderable, the Society promiſe to "give to the perſon, who ſhall import into England, from any of his majeſty's colonies in North America, the greateſt quantity of pot-aſh, not leſs than fifty ton, neareſt in goodneſs "to the beſt foreign pot-aſh, at any one port; "one hundred pounds." This was advertiſed to the year 1761: when the Society, likewiſe, added a ſecond, and a third premium; and offered, "fifty pounds for not leſs than thirty tons; and "forty pounds for twenty tons." The advertiſement was thus continued to 1762: and then the Society thought proper to alter it, as follows; requiring leſs quantities to be produced; and offering the premium for different diſtricts. "For the "greateſt quantity of good merchantable pot-aſh, "not leſs than twenty ton weight, that ſhall be "produced in, and imported from, the colonies of "Nova-Scotia, New Hampſhire, Maſſachuſets-"Bay, Rhode Iſland, and Connecticut, conſidered "as one intire diſtrict, into the port of London, "one hundred pounds. For the next greateſt "quantity, not leſs than ten ton weight; fifty "pounds." The like premiums were, alſo, extended to the colonies of New-York, New-Jerſey, and Penſylvania, conſidered as one diſtrict; and, likewiſe, to the colonies of Virginia, Maryland, North Carolina, South Carolina, and Georgia, conſidered as another diſtrict.

The quantity required to claim theſe premiums, even when reduced to twenty tons, was more than could be ſupplied by any works then on foot: and,

conſequently, no claims were made, with any pretenſions that could intitle the candidates.

In 1761, the miſcarriages of Mr. Stevens's works being known; and of courſe, the inefficacy of the Society's premiums, in their preſent mode; a new plan of proceeding was propoſed by a member, who particularly concerned himſelf in the Society's meaſures for the intereſt of the colonies. He advanced, that there was now no chance of inducing perſons to engage in large and expenſive works for making pot-aſh; as the example of the late miſcarriages had damped all ſpirit for this undertaking: that, neceſſarily, the offering premiums for great quantities could have no influence; and that the only way, therefore, which remained, was, to furniſh the information of a profitable method of doing it in ſmall quantities, with little or no previous expence: and, after this information had had its due effect, to adapt the premiums to the circumſtances, in ſuch manner, that every one, who would enter into the propoſed undertaking, ſhould receive a proportionable part of the advantage of them. Some very reſpectable gentlemen of the colonies, concerned in the public affairs of the reſpective provinces; and who well knew the particulars of the late attempts that had been made to produce pot-aſh in America; ſupported this advice: which was, accordingly, at their earneſt ſollicitation, put in execution.

The perſon who had propoſed this meaſure, and intimated the practicability of ſupplying inſtructions for making pot-aſh advantageouſly in ſmall quantities, was requeſted by the Society to furniſh ſuch inſtructions; in order that they ſhould be ſent to America, and diſperſed in thoſe colonies, where pot-aſh could be made. He, accordingly, formed

formed a ſet of ſuch inſtructions, which was approved of, as proper for the intended purpoſe. In this, were contained directions, by which any perſon might make pot-aſh, from the aſhes of wood burnt in their own houſes, or thoſe they might procure from their neighbours, in the iron pots which they uſed for dreſſing their victuals; or in greater quantities, with a larger apparatus, appropriated to this purpoſe; but yet ſuch as could be procured at a ſmall expence, and not ſubject to any deſtructive accidents in its uſe. In order to convey theſe inſtructions into as many hands as poſſible, in the places where they might be ſerviceable, they were annext to the liſt of premiums, printed annually by the Society, for the uſe of the colonies; and ſent to be diſperſed there.

Theſe meaſures effectually anſwered the end propoſed. Many people, being furniſhed with the knowledge of an eaſy method of making pot-aſh, which could be practiſed without expence or riſk, applied themſelves to this purſuit: and manifeſted the efficacy of it, by the claims they afterwards made for the premiums.

The firſt intelligence the Society received of this ſucceſs, was in 1763, from a gentleman, who had ſent over, as we ſhall ſee below, twelve tons of alkaline ſalt, prepared by this proceſs; but purified ſo as to come within the denomination of pearl-aſh. In a letter to the Society on this occaſion, he mentioned the progreſs this article was then making: and declared, that the Society had purſued the only means which could have led to the quick and general eſtabliſhment of the making pot-aſh in America; by ſupplying the proceſs for making it eaſily, that had been ſubjoined to their colony book of premiums; and which he had experi-

experimentally found to anſwer perfectly well the end.

At the ſame time, the period having expired to which the premiums for importing large quantities of pot-aſh has been extended, the other part of the plan above-mentioned, which reſpected the giving them for each ton, was carried into execution; and the following advertiſement was reſolved upon: "For every ton of merchantable "pot-aſh, made in any of his majeſty's domini- "ons in America, imported into the port of Lon- "don, within the year 1765, four pounds, ex- "cept the ſeveral claims ſhall amount to a greater "ſum than four hundred pounds; in which caſe, "the ſaid four hundred pounds ſhall be divided "amongſt the claimants, in proportion to the re- "ſpective quantities imported by each." This advertiſement was continued to the year 1766; and then dropt: the object appearing at that time to be fully attained.

In the year 1763, claims were made on the Society, by ſeveral candidates; and allowed, to the amount of twenty-two tons. Of this pot-aſh, ſome was ſo good as to be fit to be uſed for bleaching, and other purpoſes, which require a pure kind of alkaline ſalt. The next year, 1764, the claims allowed aroſe to ninety-nine tons: and, in 1765, they ſtill advanced to greatly upwards of one hundred tons: which appeared ſo great a progreſs, that the Society deemed the article fully eſtabliſhed.

The year after, the Aſſembly of New-England applied to the Society for their aſſiſtance in overcoming ſome obſtacles, that had ariſen to the carrying to its full extent, the manufacture of pot-aſh in North America. Complaints had been made, with regard to a conſiderable part of what had

had been more lately ſent to England, of depravities, which tended to diſcredit the American pot-aſh, and lower the price of it, ſo as to diſcourage the progreſs of the manufacture. This had given ground to a ſuſpicion and charge of adulteration: and the Houſe of Aſſembly, therefore, requeſted information of the Society: Whether that charge appeared to have juſt foundation: and what the beſt means might be, to diſtinguiſh the ſophiſtications of pot-aſh in any parcels, in order for the taking meaſures to ſuppreſs the practice of them. The Houſe of Aſſembly ſignified further to the Society, that it was intended by them, when they ſhould be provided with a proper criterion or method of aſſaying, as it was called, the pot-aſh, not to ſuffer any to paſs, but what came up to a certain ſtandard of goodneſs. The Society, in conſequence of this application, procured ſamples of a variety of parcels of the American pot-aſh; and deſired the aſſiſtance of the perſon, who had before given them the proceſs by which this manufacture had been eſtabliſhed; and alſo of two gentlemen, who were particularly verſed in chemical matters. One of theſe gentlemen, being indiſpoſed in his health, declined the taſk. The others gave in, each, a memoir of their opinion, founded on experiments. They varied, however, conſiderably in their notions. The perſon, who had drawn up the ſucceſsful proceſs ſent to the colonies, maintained, that, though there was a large mixture of neutral ſalt in ſome parcels; and they were cauſtic and foul, ſo as to be wholly unfit for bleaching, and other finer purpoſes; yet the whole of this might happen from the kind of aſhes whence they were extracted, and the ill management of the proceſs. He ſupported this by alledging, that neutral

tral ſalts abound in ſome vegetables which might be burnt to make the aſhes: and the ſulphureous matter, which will remain, if the pot-aſh be not well purified, after the evaporation, by due heat, accounts clearly, or rather is the ſole cauſe of ſuch a cauſtic quality: which is different from that kind of cauſticity induced on fixed alkaline ſalts, by the action of lime, or great calcination: and which is, in fact, only a privation of the fixable air. The other, on the contrary, declared it to be his ſentiments, that ſophiſtications had been practiſed; and particularly by the uſe of lime; to which he imputed the cauſticity of the pot-aſh. They both added inſtructions for the determining the purity of fixt alkaline ſalts; and conſequently, of aſcertaining the goodneſs of the pot-aſh. The Society very properly avoided any diſcuſſion as to the comparative juſtneſs of opinions; directed both the memoirs to be printed, and ſent to America; and preſented each of the authors with a gold medal. But as it appeared now, that ſtrict cautions were required to be given, in the preparation of pot-aſh; and, alſo, that the reaſons, which originally ſubſiſted for confining the inſtructions to the conducting ſmaller works, ceaſed at preſent: the perſon, who ſupplied the proceſs printed by the Society at firſt, now propoſed to make ſome alterations in it, and to add ſome further directions, in order to accommodate it to the preſent circumſtances. This was accordingly done; and ſubjoined to the memoir given by him, when ſent to America. As the faultineſs of the pot-aſh lately made in America, proceeded from a bad conduct of the proceſs, this was the moſt proper, or indeed the only method, which could be followed, of applying a remedy. Since it would be in vain,

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for the government of the provinces, to exerciſe any coercive means to make the people produce this commodity in a perfect ſtate, before they were furniſhed with the means to do it. Till this ſhould be brought about, a prohibition of the exportation of all, that was not of a ſtandard goodneſs, would check and diſcourage the manufacturers, ſo as to diſpoſe them to quit the undertaking, before they had made themſelves maſters of the art. It would, likewiſe, in a great degree, confine the manufacturers to the uſe of aſhes obtained from wood burnt on purpoſe. Since they could not depend ſufficiently, for making a pure kind of pot-aſh, on ſuch as are now collected from families in conſequence of their domeſtic fires. It would reſtrain them, alſo, for the ſame reaſon, from burning any kinds of vegetable ſubſtances promiſcuouſly. Both which limitations would greatly tend to leſſen the general quantity of pot-aſh produced. Moreover, the worſt ſort of pot-aſh may very well be uſed for ſome purpoſes; and will, conſequently, bear ſome price in Great Britain; and if none but the finer ſorts were brought over, as the quantity of them is as yet but ſmall, the price of them, and of pearl-aſh, would of courſe be greatly raiſed. As the fine pot-aſh muſt be then applied to the purpoſes, for which the coarſe are now uſed; and which demand a great quantity. This would neceſſarily either injure ſome of our principal articles of manufacture, where alkaline ſalts are required, by the high price, or abſolute deficience of a due quantity of the finer pot-aſh and pearl-aſh for the ſupply of the whole demand; or would occaſion the recurring to the importation of coarſe pot-aſh from the north-eaſtern parts of Europe: which has been excluded by the

introduction of the American. It would be, therefore, much better to make a regulated diſtinction between the fine, and coarſe pot-aſh; mark the parcels of each, after a proper aſſay, made according to the principles laid down in the aforementioned memoir; and ſuffer both to paſs, but under their reſpective denominations thus noted. By this means the credit of the American pot-aſh would be ſupported. Becauſe they, who had occaſion for the fine, would not be diſappointed, by having the coarſe put into their hands. While, at the ſame time, the market would be ſupplied with the coarſe for the uſe of thoſe, whoſe purpoſes it might ſuit: and who would have it on cheap terms; and not be obliged to purchaſe the finer kind of pot-aſh, or the pearl-aſh, at a much higher price; and, by ſuch means, deprive thoſe of them, who indiſpenſibly want theſe purer kinds of alkaline ſalts.

From what is above premiſed, it evidently appears, that an eſtabliſhment of the manufacture of pot-aſh in America was wholly owing to the means uſed by the Society. Yet ſome attempts have been made to rob them of the honour of it. In a malignant letter, publiſhed in one of the daily papers, a poor effort was made to miſlead the world into an opinion, that the proceſs for making pot-aſh furniſhed by the Society to the colonies; and which, as it appears, by a variety of authorities, is that really practiſed; was taken from the proceſs publiſhed by Mr. Stevens. In order to gain credit to this falſe ſuggeſtion, citations were made of the accounts of the apparatus, and of mutilated paſſages, and other particulars, out of both the proceſſes. The neceſſary veſſels, and the manner of making the ley, did indeed appear ſimilar in them: there being no novelty

novelty in either. For the operation conſiſting only in mixing water with the aſhes, and drawing it off after it is impregnated with the ſalt, is of ſo ſimple a nature as ſcarcely to admit of any variation, but that of adapting the magnitude of the veſſels, or the convenience of their form, to the quantity of the ley required: and they are, therefore, much the ſame every where. But, in order to carry the reſemblance into that part of the two proceſſes, where the eſſential difference lay; and on which the ſucceſs of one method, and the failure of the other, depended; a moſt falſe and baſe miſquotation was employed. The deſcription of Mr. Stevens's furnace, which ſerved both for evaporation and fluxing the ſalt, was ſuppreſt: and that of a caldron was obtruded in its place, which he never mentions in his proceſs for making pot-aſh: and which could have no poſſible office, or uſe in his method: his evaporating and fluxing furnace being a ſubſtitute for it. In fact, whoever compares the two proceſſes will clearly ſee, the one was adapted to the view of ſaving the hazard and expence neceſſarily incurred in the other; and the ſucceſs of it, after the failure of the other, without any ſpeculative compariſon, demonſtrates the difference, by a palpable fact; and at the ſame time expoſes the turpitude of ſuch mean low endeavours to impoſe on the public, and depreciate the Society, for the ſake of an envious diſparagement of a particular perſon. Let the Society, therefore, have the full acknowledgements due to them both from their mother-country, and the colonies, for having procured to the firſt a durable ſupply of an article abſolutely neceſſary to our moſt important manufactures; which we were, otherwiſe, in the greateſt danger of failing to procure: and

ſaved to the Britiſh community the great ſum of money we formerly paid for very near the whole of what we conſumed of it to foreigners; which will now be a future ſource of riches to the colonies.

Along with the encouragement of the making pot-aſh in America, the Society took up that of *making* PEARL-ASH; which is intirely a ſimilar article, as the one is, in fact, only a purer kind of the other: and applicable to the ſame general purpoſes. What has been before ſaid of the pot-aſh may, conſequently, be applied to pearl-aſh, as far as regards the utility, and the reaſons for the Society's adopting it as an object of their premiums.

The firſt, they offered, were in 1761, and were adverti ſed as follows: "To the perſon, who ſhall "import, from any of his majeſty's colonies in "America, into any port in England, the great-"eſt quantity of merchantable pearl-aſh, the pro-"duce of the ſaid colonies, not leſs than thirty "tons, one hundred pounds. For the next greateſt "quantity, not leſs than twenty tons, ſixty pounds. "For the next greateſt quantity, not leſs than ten "tons, forty pounds." Theſe premiums were continued for 1762: at which time, the Society changed the mode; and advertiſed the ſame premiums for this article, as thoſe for the pot-aſh above recited.

In 1763, the advertiſement was again altered, and a premium of four pounds per ton for pearl-aſh imported here was propoſed, with the ſame reſtrictions as in that for pot-aſh of the ſame date. It was continued thus to the year 1767: when it was dropt.

The premiums offered for the large quantities, before 1763, were never claimed. The firſt application

plication, which was of the nature of a claim, was made, in that year, by the gentleman abovementioned, who gave the account of the good effects of the process for making pot-aſh, publiſhed by the Society. He ſent notice, he had imported twelve tons of pearl-aſh: and the ſpecimens which were produced, appeared, on examination, to be good. But not having complied with the conditions of the Society's advertiſements, as to the form of certification; and intimating his deſire of receiving an honorary, rather than a pecuniary reward; they gave him their gold medal, on the merits of his being the firſt who had made, in America, and imported into Britain, a conſiderable quantity of good pearl-aſh.

The firſt, and only regular claim was in the year 1766, when there was one candidate; to whom ſix pounds two ſhillings were given, as the proper ſhare of the premium for the quantity imported.

It may be collected, from this want of claims of the premiums, that the preparation of pearl-aſh has not made a correſpondent progreſs in our colonies with that of pot-aſh. The reaſons, moſt probably, are, that it demands the expence of an additional furnace, which requires ſome ſkill in the conſtruction; as alſo, of the knowledge of an operation for calcining the alkaline ſalt, as prepared according to the Society's proceſs for pot-aſh: or, if not very pure, of refining it, by ſolution and evaporation. But the higher price of pearl-aſh; and the certainty of vending it, if good; would render the preparation of pearl-aſh very profitable to thoſe, who would undertake the making it in conſiderable quantities, inſtead of the pot-aſh. And the alkaline ſalt, prepared by the Society's

proceſs, is eaſily convertible into good pearl-aſh by calcination only: provided it be made from wood, or other vegetable matter, that contains the leaſt quantity of neutral ſalt; and the ley be of due purity. There can be no doubt, conſequently, but that the preparation of pearl-aſh will gain ground in our colonies: and that our conſumption will be thence ſupplied. Though, if the pot-aſh, produced by the Society's proceſs, were prepared in a perfect manner, it might be ſubſtituted for pearl-aſh, in moſt of the principal uſes; and would ſuperſede a great part of the demand for it. In either light, the Society's endeavours will have had the deſired effect; and procure for the public, one of the moſt important advantages to our commerce.

Theſe are the articles reſpecting improvements in the colonies, for which the Society have propoſed premiums, that have been obtained. There are many others, ſome of them of conſiderable moment, for which they have offered premiums, that have not been claimed. But, for the reaſon advanced before, the knowledge and remembrance of them ought to be kept up, and propagated by every means: as it may conduce, in ſeveral caſes, to the future attainment of the object.

One of the firſt of theſe articles was, *the cultivation of* LOGWOOD *in our American colonies*. The utility of this wood in dying; and the difficulties and conteſts betwixt ourſelves and ſome other powers, which have attended our cutting it in the bays of Honduras and Campeachy, whence we have been ſupplied with the greateſt part of what we conſume; diſpoſed the Society to believe, it might be good for the public, to obtain it from our undiſputed dominions in America.

Accordingly,

Accordingly, in 1757, the Society offered the following premium. "For planting the greateſt "quantity of logwood, in any of our plantations, "twenty pounds. For the ſecond greateſt quan-"tity, ten pounds." In 1758, the firſt, only, of theſe premiums was continued. And, inſtead of the ſecond, "forty pounds were propoſed to be given "for planting the greateſt number, not leſs than five "hundred, of logwood trees, before December "1760." In 1760, the premium that was offered in 1757; and which was continued, with the alterations above mentioned to have been made in it; was dropt. But the premium of forty pounds, firſt propoſed to be given in 1758, was advertiſed till the year 1761; when it was, alſo, diſcontinued. In 1762, this matter was taken up afreſh by the Society; who then increaſed the propoſed reward greatly. For in that year, they offered "one "hundred pounds, for planting the greateſt quan-"tity, not leſs than one thouſand; and fifty "pounds, for not leſs than five hundred plants of "the true logwood tree, in any of the Britiſh "Bahama Iſlands in America." And they were thus advertiſed to the year 1765: when the premiums for this article were intirely dropt.

Theſe premiums were never gained. The logwood tree had, before the time they were firſt offered, been carried into Jamaica, Barbadoes, and other of the ſugar iſlands: where it was found to be ſo far from a deſirable ſubject of culture, that, from its great proneneſs to propagate itſelf, it was become very troubleſome, as a weed. Quantities of the wood have been imported hither from thence; particularly from Jamaica. But it has been looked upon as inferior in goodneſs to the Campeachy and Honduras logwood. As the plant

is actually of the ſame ſpecies in both places, this difference muſt be imputed to the want of age in the trees from whence the wood was obtained in our iſlands: or to ſome other miſmanagement. However, under theſe circumſtances, ſmall pecuniary premiums for the cultivation of trees, which grew wild ſo profuſely; and which were not, in general, eſteemed worth the cutting down; could have no operation in the ſugar iſlands. If they could have taken effect any where, it muſt have been in the Bermuda, and Bahama iſlands, where, wanting greater objects, leſs become of importance. But the diſtant return which trees afford; and the labour of planting, fencing, cutting, &c. prevent planters from chuſing ſuch articles, while others remain, where they may employ their money and attention with a proſpect of quicker gain. The Society, therefore, have, very properly, diſcontinued theſe premiums: and it is a matter of leſs concern, that they did not meet with ſucceſs: as we have now an eſtabliſhment, in the part of America, which has hitherto afforded us logwood; whence we may be, with eaſe and certainty, ſupplied, without the difficulties, and diſputes, that have formerly occurred.

The production of SAFFLOWER *in our American colonies*, was another article of a ſimilar kind, of which the Society took up the encouragement at the ſame time. It is the petals, or leaves of the flower of an herb, called *Carthamus, or baſtard ſaffron:* and is of great uſe in dying. We are at preſent ſupplied with this drug from the warmer countries of Europe; principally from Spain. The carthamus is an annual plant: and there appeared reaſon to believe, it might be cultivated eaſily in our American colonies. The Society, therefore, in 1757, of-

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fered the following premium. "For ſowing, "raiſing, and curing the greateſt quantity of ſaf- "flower, in any of our plantations, not leſs than "five hundred pounds weight, fifteen pounds." The next year this premium was again advertiſed: and ten pound were, alſo, then offered for the ſecond greateſt quantity. Theſe premiums were continued to the year 1762. But then the Society greatly augmented them: and propoſed, in the following advertiſement, to give "fifty pounds, "for producing in, and importing from, any of "the Britiſh colonies in America, the greateſt "quantity, not leſs than one hundred pounds "weight, of merchantable ſafflower: and for the "next greateſt quantity, not leſs than fifty pounds "weight, twenty-five pounds." In 1763, the ſame premiums were offered: but the Society reduced the quantity to be produced to fifty pounds weight in the firſt, and twenty pounds weight in the ſecond premium. They were thus continued to 1766; but then dropt.

This premium was never claimed. Though it has been ſaid, attempts have been made to produce ſafflower in ſome of our northern colonies. The great obſtacle is, the labour required in collecting the flowers, and picking the petals from them: of which, from their ſmallneſs, a very great number go to form a pound weight, when they are dried: and, moreover, the price of ſafflower is low with us. This renders it a leſs ſuitable matter to the colonies, where labour is dear: and where ſuch articles as require it, cannot, conſequently, take place, till the people are more numerous, and ſupplied more cheaply with thoſe neceſſaries of life, they have now from Europe. The Society, however, did very properly, in endeavouring to procure

procure a trial, how far it might be practicable to introduce the cultivation of ſaffower into our American colonies.

The cultivation of OLIVE TREES, *with a view to the production of* OIL *in our American colonies*, was a very important object of the Society's early attention, and premiums. The great conſumption we make of olive oil, as well in manufactures, and other uſes, as for the table, renders it deſirable we ſhould produce this article among ourſelves, and not continue the advantages of it to foreigners. There was, moreover, a very ſpecious proſpect that, out of the variety of climates, and ſituations of the countries we poſſeſs in North America, ſome might be favourable to olive trees, and admit of their being cultivated, ſo as to yield fruit equally well with thoſe on the eaſtern continent, which produce the oil conſumed by us. The Society, therefore, in the year 1760, propoſed the following premiums.

" For planting, cultivating, and properly ſe-
" curing, within four years from the date hereof,
" in any of our colonies ſouthward of the Delawar
" river, the greateſt number of olive trees, not
" leſs than one thouſand, for the production of
" oil, fifty pounds.

" For the ſecond greateſt number, not leſs than
" eight hundred, forty pounds.

" For the third greateſt number, not leſs than
" ſix hundred, thirty pounds."

In 1759, the Society propoſed to give the like premiums, on the above conditions, " for the " planting the greateſt number of olive trees, " within four years from ſuch date." Theſe premiums were diſcontinued at the expiration of the reſpective terms ſpecified in the advertiſements.

But,

But, in 1762, another advertiſement was thrown out by the Society, for the encouragement of this article; in which the ſums were augmented, and the number of trees to be cultivated, reduced. "One hundred pounds were offered at that time, "for the greateſt number, not leſs than five hun- "dred plants, of olive trees, of the ſame ſpecies "as thoſe from which the beſt Italian oil is pro- "duced, properly planted, and effectually fenced, "ſecured, and cultivated, within any of the Britiſh "colonies upon the continent of North America, "to the ſouthward of the river Delawar, conſi- "dered as one diſtrict, between the 25th of April "1763, and 25th of April 1765; and fifty "pounds for the next greateſt number, not leſs "than two hundred plants." Theſe were conti- nued to the year 1767; and then ceaſed.

Theſe premiums were never claimed. But they had the effect of procuring trials of the cultivation of the olive tree, in various places within the diſ- trict deſcribed; of which the Society has been ap- prized. It is remarkable of this tree, that it will live in England, and many of the northern parts of Europe, but not produce fruit: and ſomewhat like that was found to happen in the parts of North America, for which the premiums were propoſed. This may be imputed to cold in the one caſe, but cannot in the other; as ſome of thoſe countries are much hotter in ſummer than many places on the eaſtern continent, where olive trees not only thrive, but are very fertile: and theſe countries are not ſubject to extraordinary cold in winter. It ap- peared, however, by ſeveral accounts, that olive trees did not produce fruit in the North American provinces, where it was propoſed, by the Society, to encourage the planting them: and they, there-

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fore, diſcontinued their premiums; as deeming the object hopeleſs. Nor has there been any information ſince of better ſucceſs: as it has never been pretended, that olive trees have afforded good fruit in thoſe parts of America: at leaſt in ſuch quantities as promiſed to be of any commercial benefit. It muſt be allowed, nevertheleſs, to be probable, that ſome place or other, in the very large extent of country, we now poſſeſs in America, may be ſuitable to this tree: and that, hereafter, it may be cultivated with benefit. The Society have laid the foundation for ſuch expectations, by having promulged the notion of the utility, and incited, by their premiums, the introduction of the olive tree into ſeveral parts of North America; from whence plants of it may be eaſily conveyed, in order to the trial of them in other places, where it has not yet been determined whether they will prove fertile or not.

The *production of* COCHINEAL *in our colonies in the Weſt Indies*, was, likewiſe, thought a fit object of the Society's encouragement. This drug is of the greateſt conſequence in dying: as not only the ſcarlet in woollen, but many other important grain colours, both in woollen and ſilk, depend upon it. The conſumption is, therefore, very conſiderable, as well as the price great: and we are obliged to purchaſe from foreigners, the whole of what we conſume of the true kind. Cochineal is a ſmall fly, which breeds on a particular ſpecies of the opuntia, or Indian fig. But, beſides the true kind, there is another ſpecies, more generally found: which breeds on other ſpecies of the opuntias. This is called the Sylveſter: and is much inferior for the uſes of dying; but yet collected and

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brought to Europe, where it is ſold at a lower price.

It was preſumed, from miſtaken information, that cochineal was naturally found in South Carolina; and concluded from thence, that it might be propagated there, and rendered an article of commerce. This aroſe from not diſtinguiſhing the true kind from the Sylveſter: which ſeems to attend ſome ſpecies of the opuntia every where; as I have ſeen it on a plant of that kind, even in a hot houſe near London. The ſimilarity of climate, and other circumſtances, gave reaſon to believe, with ſtill greater foundation, that this animal might be produced in our Weſt India iſlands, with the ſame natural advantages as on the parts of the continent of America belonging to Spain. And the ſame confuſion of the two ſpecies of this kind of fly, occaſioned it to be aſſerted by many, that the cochineal abounded in Jamaica, and others of our Iſlands. The Society, on theſe grounds, were induced, in the year 1759, to offer the following premiums.

" For the greateſt quantity of cochineal, not " leſs than twenty five pounds weight, properly " cured, that ſhall firſt be produced from any " plantation, or plantations, by any planter in " South Carolina, within the ſpace of three years " from the date hereof, one hundred pounds.

" For the ſecond greateſt quantity, not leſs than " twenty-five pounds weight, as above, fifty " pounds.

" For not leſs than twenty-five pounds weight, " produced as above, in Jamaica, one hundred " pounds.

" For the ſecond greateſt quantity, not leſs than " twenty-five pounds weight, fifty pounds.

" The

" The like premiums were propoſed to be given " for the production of the abovementioned quan- " tity of cochineal, in any of the Britiſh colonies, " ſettlements, or dominions."

In 1762 the Society augmented the premiums, and thus divided them. " For the greateſt quan- " tity of cochineal, not leſs than twenty-five " pounds weight, producing in, and imported " from, the Bahama iſlands, between April 1762, " and April 1765, one hundred pounds.

" For the ſecond greateſt quantity, not leſs than " twenty pounds weight, ſixty pounds.

" For the third greateſt quantity, not leſs than " fifteen pounds weight, forty pounds.

" For the fourth greateſt quantity, not leſs than " ten pounds weight, twenty pounds.

" For the fifth greateſt quantity, not leſs than " five pounds weight, ten pounds.

" The like premiums are propoſed to be given, " upon the ſame terms and conditions, for coch- " neal, produced in, and imported from, the " provinces of Georgia, South Carolina, and " North Carolina, conſidered as one diſtrict: and, " alſo, from the iſland of Jamaica."

In 1765, the ſame premiums were again offered " for the production of cochineal in, and importation " of it from, Jamaica, the other Weſt India iſlands, " and his majeſty's dominions in North Ame- " rica, conſidered as three ſeparate diſtricts, between " April 1765, and April 1766." And that year, they, alſo, offered " ſeventy pounds, in the diviſion " of forty for the firſt, twenty for the ſecond, and " ten for the third greateſt quantities of cochi- " neal, produced in, and imported from, his ma- " jeſty's dominions in North America, the Weſt " India iſlands, and the Bahama iſlands, between

"April 1766, and April 1767." Theſe were the laſt premiums offered for this article. For at that period they were diſcontinued.

Theſe premiums were never claimed: nor is it extraordinary they ſhould not. Since the notion, that the animal itſelf, or the plant on which it breeds, are produced ſpontaneouſly in North Carolina, is intirely without foundation: nor is it at all certain, that either the one or the other would live and thrive in that country: as they are the produce of hotter climates: though there are other ſpecies of the opuntia found much farther north. With reſpect to our Weſt India iſlands, the climate would be leſs dubious. But there is no good authority for concluding, the true cochineal was ever found in them: and, therefore, reaſon to believe it is not a native of them. And as to the ſpecies of opuntia on which this fly propagates, there is ſcarcely more ground to imagine it is indigenous in thoſe iſlands; notwithſtanding what a well known writer has ſaid on this head. This matter is, therefore, attended with more difficulty than is likely to be encountered by proprietors of plantations in the ſugar iſlands. They muſt procure the plant, and animal; and learn an art reſpecting the treatment of both, that requires ſome ſkill and experience in the exerciſe of it; before they can expect to reap advantages from this attempt: and it is well known, they turn their views to eaſier, ſurer, and more extenſive purſuits. In the Bahama iſlands it would be more ſuitable, if the country ſhould prove favourable to the animal and plant: and it were to be wiſhed, that this, and ſome other matters of a parallel kind, ſhould be tried there. But without an auxiliary aid from ſome other quarter, in procuring the fly, plant, and

and inſtructions to manage them properly, the planters in thoſe iſlands are not very likely to provide themſelves with thoſe requiſites.

The *production of* RAISINS *in our American colonies*, was another of the early objects of the Society's views. The utility of this acquiſition, could we obtain it, is ſufficiently obvious. We conſume great quantities of raiſins; and we purchaſe the whole of foreigners. The Society, therefore, in the year 1759, inſtituted the following premium. "To "the perſon, in any of our American colonies, "who ſhall firſt raiſe, and ſecure, from his own "plantation, and import into the port of London, "within ſix years, from the twenty-fifth of March "1759, five hundred pounds weight of good "raiſins, fifty pounds."

There was never any claim made for this premium: nor, as appears, any effort to obtain it.

This mode of premium appearing thus not effectual for the purpoſe; the Society, in the year 1762, changed it to the cultivation of the vines which produce raiſins; and adverti ſed as follows. "A premium of three hundred pounds will be "given to the perſon, who ſhall, on the firſt of "September 1767, have, or be poſſeſſed of a "vineyard, or plantation, in any of the colonies "upon the continent of North America, ſouth-"ward of the river Delawar, conſiſting of the "greateſt number of vines, not leſs than fifty, "actually producing the true Malaga grape, from "which the beſt raiſins are made. And one hun-"dred pounds for a like plantation, or vineyard, "conſiſting of not leſs than twenty-five plants, "producing the ſaid grapes." The next year the Society advertiſed, that they propoſed to continue theſe premiums to the year 1770.

Theſe

Theſe premiums do not appear to have had more effect than thoſe for the raiſins themſelves. The neglect of this matter muſt be imputed to the difficulty of procuring, originally, the kind of vines required by the premium: which, together with the remoteneſs of profit, and the uncertainty of ſucceſs in the undertaking, have diſcouraged perſons from ſetting about it. The future proſpect of this purſuit depends on the event of the vineyards now planted for wine. For the ſame unfavourable circumſtances, above mentioned, that are found, with reſpect to them, would neceſſarily attend the grapes deſigned for raiſins. The Society have, however, by the offer of noble premiums, endeavoured to incite a trial of this matter, as well as of the vines for wine; and have diffuſed ſuch a knowledge of the utility of it, as muſt operate effectually hereafter, if the matter prove practicable, with regard to the natural fitneſs of any of our North American provinces, to produce grapes, on the vines carried from our continent.

The *collection, in our American colonies, of the* GUM *of the* PERSIMON TREE, *and the importation of it into England*, were made another object of the Society's premiums. This gum is of the ſame nature with that afforded by the trees of the plumb kind: nor could I ever find to what uſe it was deſigned to be applied, except in the place of the gum arabic, or gum Senegal. However, the Society, either in this view, or with ſome other intention, which was ſoon after forgot, offered, in the year 1760, the following premium.

"A premium of two ſhillings and ſix-pence, "for each pound, will be given to the perſon, "who ſhall deliver to the Society, for their uſe, "the firſt two hundred pounds weight of dry "clean gum from the perſimon tree."

To this advertiſement, was added the following *nota bene*.

" N. B. The perſimon tree grows in great a-
" bundance in ſwamps, and other uncultivated
" places in America, from New York to Georgia:
" and when the branches of the tree are broken
" off, or inciſions are made through the bark into
" the wood, the gum iſſues plentifully during the
" ſpring and ſummer months."

In 1762, the advertiſement was thus altered, the Society perceiving the other had not the wiſhed-for effect. " For the greateſt quantity of clean
" merchantable perſimon gum, not leſs than fifty
" pounds weight, that ſhall be produced from the
" perſimon tree, in any of the Britiſh colonies in
" America, and imported from thence into the
" port of London, twenty pounds.

" For the next greateſt quantity, not leſs than
" twenty-five pounds weight, ten pounds."

The next year theſe premiums were diſcontinued.

Theſe premiums were never claimed: and the reaſon was, that they could not have proved advantageous to the perſons, who ſhould have been at the expence and trouble to have obtained them. The perſimon trees are frequently found wild in ſome parts of North America: but not in ſuch numbers as to make the collection of this gum, in conſiderable quantities, eaſy. On a moderate computation, it has been eſtimated, by thoſe who have tried what could be collected, that even in the preſent ſtate, the expence of finding and gathering it, would not be leſs than three ſhillings per pound. But if ſo much were wanted as to render it an article of trade, it muſt be ſought for at remoter diſtances from the ſettlements: which would ſtill increaſe the coſt in proportion. As

gum

gum ſenegal is ſold for leſs than a ſixth of this price; and there does not ſeem to be any uſe, or conſequently vent for the perſimon gum, but in competition with that and gum arabic; it is no wonder, this matter has been neglected, or rather given up, after trial ſufficient to afford light to the undertakers, into the true ſtate of the facts, reſpecting the advantage of it. The Society, however, on a more minute information of them laid aſide the concern.

The attempt *to the preparation of* ISINGLASS *in our colonies in North America* was, likewiſe, thought a proper object of encouragement. It was at that time believed, that iſinglaſs was prepared fiſh-glue: and that it was principally, if not ſolely, made from the cartilaginous parts of the ſturgeon. As that fiſh abounds exceedingly in the rivers of North America; and it was imagined might very profitably, and commodiouſly be applied to this uſe; a premium to incite the proper trials was annexed to that offered in 1768, for the importation of pickled ſturgeon here; and was advertiſed as follows: "There being reaſon to preſume, that good iſin-"glaſs may be made from the cartilages, ſkin, "and membranous parts of the ſturgeon, it is "propoſed to give, for the greateſt quantity of "iſinglaſs prepared in North America, and im-"ported into the port of London, equal in good-"neſs to the foreign, and not leſs than five hun-"dred pounds weight, a premium of fifty pounds."

This premium was never claimed; as it was the next year withdrawn by the Society, in conſequence of information, that the national end would be anſwered by other means. A perſon had taken out a patent for making iſinglaſs in England; and had produced ſuch ſpecimens of his preparation,

that the principal members of the Brewers company made a collection for him of a conſiderable ſum of money, as an aid to his carrying on this uſeful undertaking. It was before well-known, that the iſinglaſs was obtained, either wholly, or principally, from a ſpecies of ſturgeon called the *huſo*, in the Volga, Danube, and other rivers in the north eaſtern parts of Europe: but this perſon demonſtrated, that it was not a glue extracted by art; but the meſentery of the fiſh, cured or prepared in ſome peculiar manner in its entire ſtate, which forms the iſinglaſs. He aſſerted, that the meſenteries of other fiſh would anſwer the ſame end: and propoſed to collect ſuch a quantity of thoſe of the cod in the Newfoundland fiſhery, as would ſupply the whole of our demand. On an application from him, the Society, unwilling to raiſe a rivalſhip againſt an invention, which appeared meritorious to the public; or to purſue unneceſſarily an object where the occaſion ceaſed; diſcontinued their premium for making iſinglaſs in America: But, notwithſtanding this ſpecious proſpect, the event has not equalled the pretenſions. It is ſaid by thoſe, who have made repeated trials, that the meſentery of the cod has not the requiſite properties of iſinglaſs; nor anſwers well the purpoſes of brewers, or wine-coopers, in preparing finings; which makes the great conſumption. Others ſay, that it is the difficulty in procuring quantities of this material, which has retarded the progreſs of its uſe. However it may be, the excluſion of the importation of foreign iſinglaſs is not effected by this project: and it lies open to the Society, to reſume the encouragement of any other method of producing iſinglaſs in the Britiſh dominions. Whether thoſe properties, that give the utility to iſinglaſs,

are

are peculiar to the meſentery of the huſo; whether they might not be found in thoſe of the common ſturgeon, or other fiſh, though not in cod; or whether they are the effect of ſome method of preparation, which may affect the ſolubility, tho' it does not alter the form of the membranes in the true iſinglaſs; is not hitherto well cleared up: But it would not be difficult, to obtain the knowledge of a matter, practiſed ſo extenſively, and commonly, both in the Ruſſian and Auſtrian dominions, where the iſinglaſs is produced: and the method of preparation, when accurately known, might be eaſily tried on the meſenteries of all the kinds of fiſh, that are taken in large quantities. The great conſumption, and high price of this commodity, render it an important object of regard.

The cultivation of HEMP *in our American dominions* was, likewiſe, thought a fit object of the Society's encouragement. The ſame reaſons, which have been before advanced for the cultivation of hemp in Great Britain, hold equally good for it in the colonies. The Society, therefore, conceiving, the giving a large premium on the importation of it here from the colonies would be an inducement to the cultivation of it there, offered, in the year 1760, the following. "A premium of "one hundred pounds ſterling, will be given by "the Society to that perſon, who, in one veſſel, "ſhall import from any of the Britiſh colonies in "North America, at the Cuſtom-houſe in London, "the greateſt quantity of good and merchant-"able hemp, fit for his majeſty's ſervice, not "leſs than ten tons, the growth of any one of the "ſaid colonies.

"For the next greateſt quantity, ſeventy-five "pounds.

"And for the next, fifty pounds."

Theſe premiums were not claimed: nor can it appear probable they ſhould, to thoſe, who are more minutely informed of the relative facts. The American colonies are ſupplied from England with the far greater part of the hemp they uſe. The price of it, therefore, is much higher there than here. If, conſequently, any perſon, who had produced ſuch a quantity of hemp, as was required for the premium, had imported it hither, they would have ſuſtained a loſs by the difference of the price here and there, againſt which, the premium would not have been ſufficient to have indemnified them. The Society, on a conſideration of this ſubject, the next year, changed the mode of the premium; and offered it on the production of hemp in America, without requiring the importation of it into England; and they advertiſed thus: "To any perſon who ſhall, in the "year 1763, within the bounds of any part of "the provinces of Nova Scotia, and New-England, from land not before in the cultivation of "hemp, produce the greateſt quantity of good "merchantable hemp, fit for cordage, not leſs "than twenty tons, one hundred pounds.

"For the next greateſt quantity, not leſs than "ten tons, fifty pounds.

"For the third greateſt quantity, not leſs than "five tons, twenty-five pounds.

"The like premiums will be given with-"in that part of his majeſty's American do-"minions, that lies between Connecticut, Eaſt "Maryland, and the Penſylvanian territories, on "Delawar ſouth.

"The like premiums will be given within "that part of his majeſty's American dominions, "which lies between Penſylvania north, and "North Carolina ſouth.

"The

" The like premiums will be given within that " part of his majeſty's American dominions, " which lies to the ſouthward of Virginia.

" N. B. The firſt diviſion contains the province " of Nova Scotia, New Hampſhire, Maſſachuſets- " Bay, Rhode Iſland, and Connecticut.

" The ſecond, New York, New Jerſey, and " Penſylvania.

" The third, the Penſylvanian territories on De- " lawar, Maryland, and Virginia.

" The fourth, North Carolina, South Carolina, " and Georgia. No more than one ſet of premiums " will be given within each of the diviſions de- " ſcribed."

Theſe premiums were again offered the next year, with this alteration only, that the word *Canada* was inſerted in the advertiſement between the words Nova Scotia, and New Hampſhire. They were continued thus to the year 1766, and then dropt.

Theſe premiums were not, however, claimed: which muſt be imputed to the greatneſs of the quantity required. For, as well before, as during the time of offering them, leſs quantities of hemp had been cultivated by numbers, in various places. Indeed the government had taken proviſional meaſures in the grants of land, in ſome colonies, that a certain proportion of hemp ſhould be raiſed. It was proper, therefore, the Society ſhould propoſe the premiums on ſuch difficult terms, in order that they ſhould not be gained, but by ſome extraordinary effort towards an advance of this article. It has been ſaid, that the quantities required were more than could be practicably attempted: but this cannot hold of the leaſt premium; which demanded only five tons. And, indeed, the difficulty in the others lay only

in the want of hands to manage the hemp after its maturity. There was a very extraordinary proof of this, in the inſtance of a gentleman in one of the colonies, who informed the Society, that he had raiſed, as he ſuppoſed, fifty tons of hemp; but that, for want of people, and knowledge in the proper manner of reaping, and dreſſing, he loſt almoſt the whole. The ſame impediment, as to want of knowledge, is one general cauſe, no greater progreſs has been made in ſo important an article. But it appears, as well from numbers of paſſages in letters, as from various repeated applications to the Society, from perſons of great conſequence in the colonies, that the furniſhing information of ſuch kind would be much more effectual than any premiums, in this, and other matters of a ſimilar nature. In all ſuch caſes, where any propoſed undertaking is ſhewn to be profitable, and is rendered eaſily practicable by ample inſtructions, it neceſſarily carries with it its own inducement, and reward. The Society have, nevertheleſs, done all that could be, in the way of premium, to excite a ſpirit to apply to the cultivation of hemp: and, perhaps, hereafter, thro' their means, what elſe is wanting to this end may be ſupplied.

The production of OPIUM, *in our North American colonies*, was attempted to be introduced by the Society through the influence of their premiums. Opium is uſed in medicine; but in greater quantities by thoſe, who contract the habit of taking it on account of its ſedative, or intoxicating qualities. This occaſions it to be imported hither from the Eaſt, in a conſiderable quantity. It had been obſerved by ſome, that Georgia abounded with a particular ſpecies of poppy, which might be the ſame with the kind whence the opium is extracted in the Eaſt; or at leaſt might anſwer the ſame end for this

this purpoſe. At all adventures, it was not impracticable to convey the ſeed of the true Turky poppy, affording the opium, to our colonies; and cultivate it there: The Society, therefore, as well to give an intimation of the utility of ſuch an acquiſition, as to incite ſome attempts to trials of this matter, advertiſed, in the year 1760, the following premium: "There being reaſon to be-
"lieve, that the true ſpecies of poppy, from
"which the beſt ſort of opium is extracted, may
"be cultivated to advantage in ſome of our ſou-
"thern colonies upon the continent of North A-
"merica, a premium of two ſhillings and ſix-
"pence will be given for every pound weight of
"opium, equal in goodneſs to the beſt Turky
"opium, imported into the port of London,
"from the ſaid colonies.

"N. B. The beſt proceſs or method of mak-
"ing Turky opium is as follows:

"When the heads of the poppies are nearly
"ripe, but yet ſoft and full of juice, make four
"or five inciſions, with a knife, about half round
"the poppy head; and from each of theſe there
"will flow a few drops of a milky juice, which
"ſoon hardens into a ſolid conſiſtence, and is to
"be carefully ſcraped off, the next day, with a
"blunt knife; and is the fineſt opium. The op-
"poſite ſide of the head is to be wounded, and
"the opium ſcraped off, the next day, in the
"ſame manner. If the heads be wounded in the
"morning, it may be ſcraped off in the evening.

"After all the opium is collected, it is to be
"beaten or wrought upon a hard board, with a
"little water, for ſome time; and then formed
"into cakes, or rolls; and dried for ſale."

In 1763, the advertiſement was changed; and the premium greatly augmented. The Society

thought proper, to offer then, "One hundred "pounds for the greateſt quantity of opium, not "leſs than ten pounds weight, equal in goodneſs "to the beſt Turky, that ſhould be produced in, "and imported from, any of the Britiſh iſlands in "that part of America commonly called the Weſt "Indies, into the port of London, before March "1764."

"For the next greateſt quantity, not leſs than "five pounds weight, fifty pounds.

"And the like premiums are propoſed to be "given for opium produced in, and imported "from the colonies of Georgia, South Carolina, "North Carolina, and Virginia, conſidered as one "diſtrict."

The Society, the ſame year, advertiſed the ſame premiums of one hundred pounds, and fifty pounds, for the production of opium in any of his majeſty's American dominions: which were continued to be offered to the year 1766; and then ceaſed. The former were dropt in 1764.

Theſe premiums were never claimed; nor does it appear, there were any attempts made towards obtaining them. It is certain now, that the wild poppy in Georgia is not the ſame with the Eaſtern: nor, in all probability, is that ſpecies to be found in America. One difficulty, therefore, is, the obtaining the ſeed of the Eaſtern poppy freſh enough to vegetate: though, if this were the whole, it might be ſurmounted. But there is another impediment, in the preſent ſtate of our colonies, to this, as well as to the cultivation of ſafflower, above-mentioned: which is, the dearneſs of labour in North America. For the collection of the juice of the heads of the poppy, as deſcribed in the directions given in the Society's advertiſement, would employ a great number of hands, to pro-

duce

duce any conſiderable quantity: and, moſt probably, the expence of labour would be too great for the return. It were much to be wiſhed, otherwiſe, that this article had undergone actual trial. For, though the conſumption of opium in England does not indeed render it a matter of high moment, yet there is a market, where a vent might be found for very great quantities. This is in the Malay countries in the East Indies; which the Dutch ſupply with this drug, purchaſed, by them, in Bengal. They exchange it in ſome places for its weight of gold: and are ſaid, on very good authority, to return three hundred thouſand pounds *per annum* for this article. Were opium produced on cheap terms, there would be a certainty of diſpoſing of very great quantities in the Eaſt: as has already happened in the inſtance of rice. One reaſon of diſcontinuing this premium was, ſome information given to the Society, that good opium was already produced in Carolina; of which a ſpecimen, very much reſembling the Theban opium, was ſhewn. But, though that is now ſome years ago, nothing further is heard of it: and it is to be feared we muſt place this premature aſſertion to the account of the numerous miſtakes, or deluſions, which have happened among the North American coloniſts, with regard to the pretenſions of having obtained the drugs of the other continent; or of the more ſouthern climes of America.

The production of CINNAMON *in our Weſt-India iſlands*, was, alſo, another object of the Society's attempts. It is needleſs to explain the advantages of procuring the ſpices in our dominions, they are ſo palpably obvious.

The circumſtance, that engaged the Society to turn their views to the encouragement of the growth of cinnamon in our colonies in the Weſt Indies,

Indies, was, the finding, on our gaining poſſeſſion of Guadaloupe, and Martinico, in the late war, a great number of cinnamon trees, apparently growing there wild, and ſpontaneouſly. It was imagined, that ſome of theſe trees might be eaſily tranſplanted into, and propagated in our iſlands in that neighbourhood: whence we might in time ſupply ourſelves with cinnamon. The Society, therefore, offered, in 1760, the following premiums: "The "true cinnamon tree having been found to grow, "and produce good cinnamon, in the iſland of "Guadaloupe; and there being no doubt, that, "under the ſame circumſtances of ſoil, and ſitu-"ation between the tropics, it would proſper "equally well in other parts of his majeſty's co-"lonies; the Society do offer, to the perſon, "who ſhall in any other of his majeſty's colonies, "within five years from the date hereof, raiſe, or "plant, cultivate, and properly ſecure the great-"eſt number of cinnamon trees, not leſs than "two hundred; one hundred pounds. And, un-"der the like circumſtances, for the next great-"eſt number, not leſs than one hundred, fifty "pounds."

This premium was continued to 1766; and then ceaſed. But while it was advertiſed, the Society, in 1762, thought fit to offer the other premiums for the raiſing cinnamon trees, which follow: "A "premium of one hundred pounds, will be given "for the greateſt number, not leſs than fifty, of "the plants of the true cinnamon tree, which "now grow in the iſland of Guadaloupe, pro-"perly raiſed, or planted, and effectually fenced, "ſecured, and cultivated, in any of the Britiſh "iſlands in that part of America commonly called "the Weſt Indies, between January 1763, and "January 1767.

"And

" And fifty pounds for the next greateſt num-
" ber, not leſs than twenty-five plants.

" The like premiums will be given, on the
" ſame conditions, for the greateſt number of
" cinnamon trees properly planted, ſecured, and
" cultivated as above, in the Bahama iſlands with-
" in the ſame time."

They were thus advertiſed to 1767; and then diſcontinued.

Theſe premiums were never obtained, though there were ſeveral attempts made to convey the cinnamon trees; and eſtabliſh them in our iſlands: and, alſo, to raiſe them from the fruit both there, and in the hot-houſes here. There is ſomewhat, that renders this tree difficult to be raiſed by art; though it propagates itſelf freely in the places before-mentioned. It is undoubtedly not a native of thoſe iſlands, but has been brought thither by the miſſionary prieſts: who have frequently paſſed from Aſia to America; and have carried with them the products of the Eaſtern world to the Weſtern. But there wa a great ground of preſumption, that difficulties attended the production of cinnamon in theſe iſlands. As the French, who had among them ſome very able botaniſts in thoſe parts, did not appear to have made any advantage of the cinnamon tree: which they certainly would have done, had it been eaſily practicable. For the trees muſt have been in theſe iſlands a long time. It was, nevertheleſs, a very proper object of the Society's attention; though their endeavours failed of ſucceſs: as the leaſt chance of gaining ſo important a point was well worth the trouble of offering a premium.

The procuring the introduction of the MANGO TREE *into our Weſt Indian colonies* was, alſo, attempted

tempted by the Society. This tree is very general in the Eaſt Indies; and uſeful, not only as it affords the unripe mangoes for pickling, which make an article of trade; but for the ripe fruit, that is one of the moſt delicious and wholſome hitherto known. In both lights, it would be a valuable acquiſition to our American colonies in the hot climes: and the Society, therefore, endeavoured to obtain the ſtones of the fruit from the Eaſt Indies, in order to ſend them thither: and for that end offered, in 1760, "A gold medal to the perſon, who ſhould "firſt bring to England ſome of the ſtones of the "mango, not leſs than one hundred, in ſuch con-"dition, that being ſent to the Weſt Indies, by "the Society, any of them ſhall be found to vege-"tate." The advertiſement was continued to 1762; and then dropt.

This medal was never formally claimed. But ſeveral parcels of the ſtones have been given to the Society; and ſent, by them, to the proper places in our colonies: particularly ſome, this preſent year, which appeared to be in a growing condition; and will be treated with great care, at leaſt in one place. It was, ſeveral years ago, hoped, from authentic information, that this tree had been obtained in Barbadoes, in a perfect ſtate; which happened from this circumſtance. A naval commander, who was ſeparated from a fleet, in the former war with Spain, put into the Brazils; and found mango trees flouriſhing there, which had been brought from the Eaſt Indies, by the miſſionary prieſts. He procured one of them planted in earth, in a tub; and brought it with him to Barbadoes: where it was planted in the natural ground: It grew eleven years barren; but, at the end of that time, bore fruit; from which,

ſome

ſome young trees were raiſed. What is become of the original tree, or thoſe raiſed from it, I am ignorant. For, on inquiry, the fact does not appear to be well known in the iſland. But it is poſſible, the old tree, or the young ones, may be in a particular plantation, in ſome corner of the iſland, without being generally obſerved, or attended to.

The *importation of* SILK GRASS *into England*, was, alſo, made an object of the Society's encouragement. There are ſeveral vegetable ſubſtances, which paſs under this name, in different places. They are moſtly produced from the aloe; and thoſe other kinds of plants, which have the ſame ſort of long ſucculent leaves. The particular ſpecies, which the Society had in view, was afforded by a kind of ananas, or pine apple, which much reſembles the white pita, or penguin aloe; but is not the ſame. The fibres are very long; and, when manufactured, make thread, which has the gloſſineſs of ſilk: but, in ſtrength, far exceeds that, or any other known filamentous ſubſtance whatever. It has, likewiſe, the quality of enduring to be ſoaked for a very long time in water, without rotting, being weakened, or otherwiſe injured. The Indians, in the neighbourhood of the Moſkito ſhore, uſe this ſubſtance for making their cloaths, hammocks, nets, cables, and indeed every purpoſe, to which thread or cordage can be applied. The Society were led to adopt this object, by a memoir, explaining its general and commercial nature, given to them, together with ſpecimens of the ſilk graſs in its crude ſtate, as well as manufactured into thread, a hammock, and an Indian habit. They advertiſed, in the year 1760, the following premium.

"Whereas it is well known, by experiment, "that a very uſeful ſpecies of thread, or vege- "table ſilk, commonly called ſilk graſs, is pro- "duced from an American plant; it is propoſed "to give as a premium, for the largeſt quantity "thereof imported into this kingdom, in a ſtate "fit to be manufactured, not leſs than one ton "weight, collected by any of his majeſty's ſub- "jects in America, or the Weſt Indies; one hun- "dred pounds.

"For the ſecond greateſt quantity, collected "and imported by a different perſon, not leſs than "half a ton, fifty pounds.

"For the third largeſt quantity, not leſs than "five hundred pounds weight, twenty-five pounds."

This advertiſement was continued to the year 1765; and then dropt.

Theſe premiums did not occaſion the importation of any quantity of ſilk graſs here, as might have been hoped. Some alterations of the ſtate of the Britiſh ſettlements on the Muſkito ſhore, which happened after the termination of the war: together with the abſence of the perſons who were properly ſituated to have purſued the Society's views, prevented any ſtep being taken; or, perhaps, even the knowledge of the Society's premiums from reaching the place. Theſe obſtacles are, however, now removed: and there only remains one; which occurred, in conſequence of trials made on ſpecimens, at the time the Society appointed the premium. This was, that the ſame manner of heckling and dreſſing, as is practiſed for hemp and flax, did not ſuit this material. The Indians do not divide the filaments, but lay them together intire; and twiſt them with their hands: by which, they form a thread perfectly uniform, even,

even, and of great ſtrength. This would be too laborious to be expedient here. But, there is no doubt, but that ſome means of rendering the ſilk graſs fit for ſpinning may be uſed. It is intended to ſupply the Society with ſuch a quantity of this material, as may admit of its being put into ſeveral hands, to treat it in various ways, that the beſt method of manufacture may be diſcovered. When ſuch a method is brought to light, the importation will again be a fit ſubject of the Society's premiums. As the eſtabliſhing the uſe of this material here, would be greatly beneficial, from its exceeding ſtrength, and reſiſtance of putrefaction in water, which render it extremely fit for ſome very important purpoſes.

The *production of the* SUCCOTRINE ALOES *in our Weſt Indian colonies*, was taken up, as a proper object of the Society's premiums. There are various ſpecies of the aloe plant that grow naturally in America: and a very conſiderable quantity of aloes, of a coarſe nature, is imported thence, under the name of common, or Barbadoes aloes. But this kind is inferior, for medicinal purpoſes, to that brought from the Eaſt Indies, called *ſuccotrine aloes*; and not at all fit for ſome other purpoſes, in which there is a great conſumption of that ſort. There can be no reaſon to doubt, but that the ſuccotrine aloe would flouriſh in our Weſt Indian Iſlands: and, as the preparation of the aloes is eaſy, and the price great here, it would certainly be an advantageous article of commerce. This matter would be the more eaſily practicable, becauſe we have the plants in our botanical collections in England; from whence they might be eaſily had: and the propagation of them is very quick and certain. The Society, therefore, made choice of a very

proper object in this article; and advertiſed the following premium, in the year 1761. "To the "firſt perſon, who ſhall raiſe, in his majeſty's "plantations in the Weſt Indies, any number, "not leſs than one hundred, of that ſpecies of "plant, from which the ſuccotrine aloes is pre-"pared, fifty pounds."

In 1762, the Society reduced the number of plants required; and augmented greatly the premium. For then they propoſed to give "one "hundred pounds, as a firſt premium, for plant-"ing not leſs than fifty of the plants; and fifty "pounds as a ſecond premium, for the next "greateſt quantity, not leſs than fifty.

"The like premiums were, alſo, offered for "the planting aloes in the Bahama, and Bermuda "iſlands." And the following *nota bene* was ſubjoined. "N. B. The plant of the true ſuccotrine "aloe may be procured from moſt of the bota-"nic gardens about London."

Theſe premiums were continued to 1767; but then dropt.

Theſe premiums were never claimed: nor is it to be collected from any intelligence, that there has been the leaſt attempt to cultivate the ſuccotrine aloe in America. It is, nevertheleſs, a matter apparently important, and practicable. The great conſumption of this kind of aloe in leather gilding, makes it a very conſiderable article of commerce: of which we might ſave the expence to the Britiſh community, if the production were eſtabliſhed in our own colonies. This aloe may be eaſily had from London: and the labour required in the cultivation of the plant, and the preparation of this drug from it, is very moderate; and would not enhance the price beyond the due

bounds; as has been apprehended in the caſe of opium, ſafflower, and ſome other articles. The proceſs for extracting the aloes from the plant is ſimple, and attended with no difficulty or uncertainty. The leaves being pluckt from the plant, when of due maturity, muſt be gently ſqueezed by the hands, or with ſome inſtrument; and the juice they contain will flow out. This juice muſt be placed, for a night, to ſettle; and the fluid muſt be then poured off from the ſolid feculencies which will have ſubſided to the bottom. It muſt be afterwards placed in the ſunſhine to evaporate and grow dry; and is then completed. Strong preſſure muſt be avoided. It increaſes the quantity, but injures the quality.

The *production of* SCAMMONY *in our American colonies*, was another article of a ſimilar nature, which the Society attempted. This medicinal drug is brought to us from the Eaſt, principally from Aleppo: of which place the beſt kind bears the name. The demand here for it is not equal to that of the ſuccotrine aloes; but is yet conſiderable: and there can be no reaſon advanced, why the plant might not be cultivated; and the gum reſin prepared from it in ſome parts of our colonies in North America. This is much facilitated, by our being now poſſeſſed of the true ſpecies of the plant. It was brought hither from Aleppo, by Dr. Ruſſel, who, likewiſe, made himſelf maſter of the method of extracting the drug from it. It is ſo hardy, that it has flouriſhed for ſome years in the garden of the London Muſeum, And ſome of the ſeed, being ſent to a gentleman verſed in botanical matters, in one of our American colonies, he raiſed plants; which have thriven well there. The Society were induced, by theſe reaſons and

facts, to offer, in the year 1761, the following premium. "Scammony, being a drug of great "utility in medicine, and wholly purchaſed, by "us at preſent, of foreigners; though there is the "greateſt reaſon to believe that it may be pro-"duced, with advantage, in the more ſouthern "Britiſh colonies in North America; the Society, "in order to procure the eſtabliſhment of ſo ma-"terial an article in his majeſty's dominions, offer "the following premiums.

"Twenty guineas will be given to the perſon, "who ſhall firſt import the greateſt quantity of "ſcammony, not leſs than twenty pounds weight, "into Great Britain, and which is the produce of "the Britiſh dominions in America, and equal to "the beſt foreign.

"For the next quantity, not leſs than fifteen "pounds weight, fifteen guineas.

"And for the third quantity, not leſs than five "pounds weight, ten guineas.

The next year the premiums were greatly augmented: and the advertiſement altered as follows. "For the greateſt quantity of good merchantable "ſcammony, not leſs than ten pounds weight, "that ſhall be produced in, and imported from, "any of the Britiſh colonies in America, into the "port of London, between January 1763 and "January 1765, fifty pounds. For the next great-"eſt quantity, not leſs than five pounds weight, "twenty-five pounds." Thoſe premiums were continued to 1767; and then the Society ceaſed to advertiſe them.

Along with theſe advertiſements, the Society inſerted in their book of premiums, printed ſeparately for the uſe of the colonies, the following directions

directions for the cultivating and preparing ſcammony.

Scammony is a medicinal drug, formed of the juice of the root of a plant, inſpiſſated or dryed to a hard conſiſtence, by being expoſed to the air.

The plant, which affords the true kind, is a ſpecies of the *convolvulus*, or *bind-weed*, called the *convolvulus Syriacus*.

It may be cultivated by putting the ſeeds about two inches deep in the ground, at the diſtance of about four feet: and, when the plants riſe, placing tall ſticks near them, that they may creep up them, and be prevented from running together.

At the age of three, or four years, the ſcammony may be procured from them.

The manner of obtaining the drug from the plants, according to the account given by Dr. Ruſſel, in the London Medical Obſervations, who ſaw the practice in the Eaſt, is as follows. When they begin to flower, clear away the earth from the upper part of the root; and then cut off the tops of them, in an oblique or ſloping direction, about two inches below where the ſtalks ſpring from it. Under the depending or loweſt part of this ſlope, fix to each root a ſhell, or ſmall flat cup of glaſs, or earthen ware, that the juice, running from the root, may flow into it, and be retained. In about twelve hours, when the whole of the juice will be drained out of the roots, take away the ſhells, or cups; and put the contents of ſeveral of them together. The matter, thus collected, being kept in a dry ſhady place, will ſoon grow hard; and be ſcammony fit for uſe.

The drug, when pure, is light, and of a ſhining appearance when broken; but eaſily crumbled if rubbed between the fingers. The colour, while

the pieces are intire, will, however, vary greatly, from a deep black to a whitiſh yellow, in different parcels equally good.

N. B. The ſpecies of convolvulus, which produces the ſcammony, grows naturally on mountains, in a dry ſoil: and the leaves and ſtalks dye to the root every year.

Theſe premiums and information do not appear, hitherto, to have had the deſired effect. Indeed the quantity required was too large to be expected to be produced in the way of experiment. But there is reaſon to hope, as botanical and medicinal knowledge are now gaining ground in North America, and the plant is eaſily obtainable, that ſome proper perſon will make an attempt; and that the Society, though they have diſcontinued their advertiſement of premiums for it, to make room for other articles, will, when called upon, be ready to give any reaſonable aſſiſtance in this, as they have in correſpondent caſes, to promote the eſtabliſhment of a matter firſt propoſed by themſelves.

The *production of* BARILLA *in our North American colonies*, was another, and a very capital object of the Society's encouragement. This is an alkaline ſalt, of the ſame nature, with reſpect to its uſes, with pot-aſh, and pearl-aſh: and, like them, obtained by the incineration, or burning the aſhes of ſome vegetables. But the alkaline ſalt of this kind, which is called the foſſil alkali, is only afforded by ſome particular ſpecies of plants: principally thoſe, which grow in or near the ſea: The barilla is produced from burning the Spaniſh kali, an annual plant. We import a conſiderable quantity from Spain; and there ſeemed no reaſon, why the ſame might not be obtained in North America, if the plant were once introduced, ſo as to grow ſpontaneouſly;

ſpontaneouſly; or were raiſed by art there. It is procured both ways in Spain, and other coaſts of the Mediterranean: being both reaped from the wild product, and ſown in tilled fields. As there are very large tracts of ſandy ſhore, ſuitable to this plant, in our North American colonies; and it propagates itſelf with great freedom and vigour; there was reaſon to preſume, that, if it was introduced in ſome ſuch places, it would ſpread, as it is found to do on the ſhores of the eaſtern continent, in the climates not too cold for it. The plant not being to be found naturally in America, the Society had it principally in view, to encourage firſt the introduction of it there; and therefore offered, in the year 1761, the following premiums.

"Whereas barilla, obtained by the burning "Spaniſh kali, or glaſs-wort, is imported from "abroad into this country, and is uſed there in "large quantities for making hard ſope, and glaſs, "and for other purpoſes: A premium of fifty "pounds will be given to the perſon, who ſhall "ſow the greateſt number of acres, not leſs than "fifty, with the Spaniſh kali, in any of his ma"jeſty's American dominions; and having raiſed "the plant, ſhall burn it to barilla. And a pre"mium of twenty-five pounds, for the next great"eſt number, not leſs than twenty-five acres.

"N. B. It is further required, that five pounds "weight of ſeed, fit for ſowing, be ſaved from "each acre for which any claim ſhall be made "on the Society."

In 1763, theſe premiums were reſtricted to the Britiſh colonies upon the continent of America, to the ſouthward of the river Delawar. The number of acres required, were to be planted between April 1762, and April 1765. The ſame premiums

were, likewiſe, then propoſed for 1766; and the next year they were continued for 1767. But, after that period, they were dropt.

Along with the advertiſement, the Society publiſhed, at the end of their premium book for the colonies, a ſett of inſtructions for procuring and cultivating the Spaniſh kali, and making the barilla; drawn up, at their requeſt, by the ſame perſon who furniſhed the proceſs for making pot-aſh.

Theſe premiums have not been claimed. But yet the advertiſements of them, and the information of the method of producing barilla, have not failed of their due effect. There have been parcels of marketable barilla made in the colonies, and ſold in London. Whether the perſons who prepared this barilla did not uſe the Spaniſh kali at all, but ſome other plant, that affords foſſil alkali by incineration: or whether they did cultivate the kali, but not in ſufficient quantity to claim the premium, does not appear. The cultivation of that plant, however; as it requires only the ſpreading the ſeed and reaping the herb; which yields both a conſiderable quantity of vegetable matter, and proportionable product of alkaline ſalt; would certainly prove profitable to the undertaker: and every acquiſition of marketable alkaline ſalts, the product of our own dominions, would be a benefit to the public, for the reaſons abovementioned with regard to the pot-aſh and pearl-aſh.

The *collection of* SARSPARILLA ROOT *in our colonies in the Weſt Indies, and the importation of it into Great Britain*, was another article, the Society took upon them to encourage. The increaſing conſumption of this medicinal ſimple, found of the higheſt efficacy in many various caſes, render it an important object of commerce: and we are

ſupplied

ſupplied with a great part of our demand from the Spaniſh and Portugueſe dominions in America. At the ſame time, we have now ſettlements in the Weſt Indies, where very large quantities may be obtained: and though it is to be principally collected there by the Indians, yet, as they do not require money for it, but take our manufactures in exchange, it would, conſequently, be of advantage to the Britiſh trade, to be furniſhed with the whole of what we conſume from thence. The repreſentation of theſe facts, prevailed with the Society to offer the following premium, in the year 1762.

"For the greateſt quantity of good merchant-
"able ſarſaparilla root, not leſs than five hundred
"pounds weight, that ſhall be produced in, and
"imported from, any of the Britiſh ſettlements, or
"plantations, in that part of America, commonly
"called the Weſt Indies, into the port of Lon-
"don, between April 1762 and April 1764, one
"hundred pounds."

"For the next greateſt quantity, not leſs than
"two hundred pounds weight, fifty pounds.

Theſe premiums were, likewiſe, offered, on the ſame conditions, for the provinces of Georgia and South and North Carolina, conſidered as another diſtrict.

The advertiſements for this article were continued to 1766.

Theſe premiums were never obtained. But that was owing to the ſame circumſtances, reſpecting the Moſkito ſhore, as were before mentioned, on the ſcore of the ſilk graſs. The affairs of our ſettlement there, which are now put on a different footing, will remove the obſtacles to a progreſs in this matter: which may poſſibly be thus extended, ſo

as

as to furniſh the whole quantity of ſarſaparilla we want. There have been twice, however, claims made on the Society for their premium, in conſequence of parcels brought from our old colonies in North America. But though the kind of root produced for theſe claims finds a market here, the Society came to a reſolution, that it was not ſarſaparilla; and that they are of opinion, the true ſarſaparilla does not grow in North America, in any part to the northward of Cape Florida: as they are now ſenſible there is not the leaſt good authority for its having ever been found there. The ſubſtitution in our market of this falſe kind, which is a different plant from the true, and intirely deſtitute of its medicinal qualities, is a very momentous reaſon for encouraging the importation of the true kind; which the change in our concerns on the Muſkito Shore, it is hoped, will promote to the degree required.

The Society offered a premium, alſo, for *making* IRON *from* BLACK-SAND *in America*. They were, in 1763, informed by a perſon, who had made a trial of ſuch ſand, and produced good iron from it, of his experiments and ſucceſs: which induced them to give him a gold medal; and to advertiſe the following premiums:

"For the greateſt quantity of merchantable bar "iron made of the black ſand found in America, "and imported into the port of London, not leſs "than fifty tons, one hundred pounds.

"For the ſecond greateſt quantity, not leſs "than thirty tons, ſixty pounds.

"For the third greateſt quantity, not leſs than "twenty tons, forty pounds."

Theſe premiums were never claimed; nor does it appear, that any work was ever attempted to be eſtabliſhed

eſtabliſhed for making iron of ſuch ſand in America. There are ſeveral works in Europe which produce iron from the ſame kind of ſand; and it may be wrought by forging malleable iron out of it without ſmelting: as appears as well from the practice in Europe, as the experiment of the gentleman in North America, to whom the Society gave the medal for his information. The intention of the Society, in their advertiſement of this premium, muſt be conceived to be principally, the giving intimation, that this ſpecies of ſand is a valuable iron ore. Becauſe there could not be a want of pecuniary reward, to induce perſons, properly ſituated, to undertake a profitable iron work. There are very large quantities of ſuch ſands in ſeveral parts of America: and, therefore, we may hope, that the Society's information on this head may yet, hereafter, have its intended conſequences.

The Society propoſed, likewiſe, a premium *for the producing* SALTPETRE *in America.* The ſame reaſons, as were above enumerated for the eſtabliſhing ſaltpetre works in England if practicable, were urged as holding good with reſpect to America, by ſome; but others did not allow the parallel. The difficulties and impediments, however, to the doing it, with profit, from artificial beds in England, on account of the rates of labour, are ſtill greater in America. This matter, with regard to the production of nitre by art, may, therefore, on very juſt grounds, be deemed impracticable there. But there may poſſibly be natural beds of nitrous earth that may be wrought with ſome advantage. The particular reaſons, on which the Society formed their intention of offering premiums for this object, were from information laid before them in 1764, of the diſcovery of a particular method of pro-

producing nitre, of which an account had, likewiſe, been before publiſhed in an American journal. The matter appeared utterly incredible, to thoſe who underſtand clearly this ſubject. But the teſtimony ſeemed ſo good, that it could not be controverted with decency; and the Society were prevailed on to give the ſuppoſed diſcoverer a bounty of fifty pounds; and offered, in 1764, the following premium, as an encouragement to purſue the application of that method, or to diſcover any other.

"For every thouſand pound weight of merchantable ſaltpetre equal in goodneſs to the beſt imported from the Eaſt Indies, made in any of his majeſty's dominions in America, and imported into the port of London in the year 1765, five pounds; except the ſeveral claims ſhall amount to a greater ſum than three hundred pounds; in which caſe the ſaid ſum of three hundred pounds, ſhall be divided among the claimants, in proportion to the reſpective quantities imported by each."

The like premiums were propoſed to be given, on the ſame conditions for ſaltpetre, made in any of his majeſty's dominions in America, in the years 1765 and 1766; but immediately after that time they were diſcontinued.

This premium has not been claimed; nor has any thing further been heard of the extraordinary method of producing ſaltpetre which gave occaſion to its inſtitution. There can be no doubt, but that the account was owing to ſome miſtaken obſervation: as the production of nitre in ſuch manner, and quantity, as was aſſerted, is repugnant to facts and principles known in conſequence of the moſt ample experience. Whether there be any natural beds of nitrous earths that can be wrought

to

to advantage anywhere, is much doubted by ſome, who have made the deepeſt inquiry into this ſubject. And the laying artificial beds, or collecting nitrous earths accidentally formed by old buildings, ſtables, dunghills, &c. as is practiſed in the places where ſaltpetre is now produced, could never anſwer in colonies where labour is even dearer than with us. The Society, therefore, have with juſt reaſon, on reconſideration of this matter, diſcontinued theſe offers of premiums for it.

The Society, alſo, advertiſed a premium for *the diſcovery of* COBALT *in our American colonies; and its importation into England.* The reaſons, before alledged for the advantage of the diſcovery of a cobalt mine in Great Britain, really held good with reſpect to our colonies in America. The Society, therefore, offered, in the year 1764, the following premiums: "To the perſon who ſhall "diſcover cobalt in his majeſty's dominions in A-"merica, and ſhall produce one hundred pounds "of the ſame to this Society, fifty pounds.

"N. B. Satisfactory certificates of the place "where it was diſcovered, and of the probability, "that a quantity may be had ſufficient for a ma-"nufacture of zaffre and ſmalt, will be expected "by the Society."

This advertiſement was thus continued to 1767; and then dropt.

Theſe premiums have not been claimed: nor is there any great probability they ſhould. The chance of gain would certainly not anſwer the expence of opening mines with a view for cobalt alone; at leaſt without knowing the extent of the vein, and the good qualities of the product; and there are few other mines in our poſſeſſion in America, where we could expect to find cobalt. It may be pro-

proviſionally uſeful, nevertheleſs, to have propagated the notion of this mineral, and its utility. That if it ſhould be any where found, a due attention, and examination may be given to it.

The Society have offered one premium for the encouragement of the Britiſh ſettlements, which are not in America. This was for *the importation of* COTTON *from* AFRICA. There had ſpecimens of cotton been ſent to them from Senagambia, which appeared, tho' not of the very fineſt kind, to be ſuch as would be very fit for ſeveral of our manufactures. The Society were informed, likewiſe, that it could be collected, in any quantities whatever, at a low price, perhaps not exceeding a penny per pound. Some time ago, the ſcarcity, and conſequential high price of cotton were a great detriment to our manufactures of that material; and occaſioned the neceſſity of laying open our ports to the importation of foreign cotton: in conſequence of which, we now purchaſe great quantities of foreigners. It would, therefore, be of public benefit to be furniſhed from our own ſettlements; and alſo an important advantage to our manufactures of cotton, now very extenſive, to be ſupplied cheaply with it. The Society, therefore, with great propriety, in the year 1767, advertiſed the following premium:

"For the greateſt quantity of clean merchantable cotton; the growth of any of his majeſty's ſettlements on the coaſt of Africa, imported by private adventurers into any of the ports of Great Britain in the year 1761, not leſs than ten tons; a gold medal.

"For the ſecond greateſt quantity, not leſs than five tons, a ſilver medal.

"The

"The like premiums, on the ſame conditions, will be given in the year 1769."

Theſe premiums have not been claimed yet. But the advertiſement is ſtill continued: and it can ſcarcely be doubted, but that a branch of commerce ſo conſiderably promiſing profit to thoſe who may engage in it, will be at length eſtabliſhed.

Theſe were the ſeveral articles, reſpecting the trade with our colonies, for which the Society have offered premiums before the publication of their liſt in 1767. On a deliberate view of them, they muſt from the ſoundneſs of judgment, and extent of knowledge, requiſite to the ſelecting the objects, and conceiving the mode of promoting them, as well as from the importance of the views, and the liberality of the expence propoſed, do great honour to the Society.

There is, in this claſs, only one inſtance of encouragement given in the way of bounty, for any matter where the Society have not advertiſed premiums relating to the general object. This was *for the applying in America the knowledge, acquired in China, of making a preparation of the root of a vegetable, which may be uſed as a ſubſtitute for* SAGO. Specimens of this production were produced to the Society; and approved of: and a gold medal was given to the gentleman who poſſeſt this ſecret, on his declaring it to be his intention, to carry this matter into actual practice.

Beſides the method of encouraging improvements in the colonies, by rewards, the Society have, on various occaſions, tranſmitted ſeeds, models of machines, ſpecimens of deal boards, and information of various kinds, which has been requeſted: and it cannot be denied, that ſuch means

have

have been very conducive to the eſtabliſhment, or improvement of ſeveral important concerns. It muſt, and indeed has been by the colonies themſelves on ſeveral occaſions, acknowledged, that they, as well as the mother-country, have received very great benefits from the Society's endeavours for their ſervice.

Under the claſs of improvements relating to trade, muſt be included thoſe, which the Society have endeavoured to introduce in the BRITISH FISHERIES. The firſt object, reſpecting fiſheries, the Society took upon them to encourage, was, the *catching* TURBOTS. This branch of fiſhery is, in a manner, monopolized by the Dutch; who take the turbots in our ſeas, and ſell them to us for a very great ſum of money: to the amount, as ſome ſay, of ſixty thouſand pounds a year: and, according to others, much more. As turbots bear a conſiderable price, and have a conſtant market with us; there can be no reaſon given, why we might not take them ourſelves; and ſave the money we pay for them. The only obſtacle ſeemed, the want of knowledge of the proper method; which the Dutch have concealed with all poſſible caution. The Society, therefore, in the year 1762, offered the following premium.

"For every hundred turbots, of five ſcore to "the hundred, not leſs in ſize than ſixteen in- "ches from eye to fork, caught with hooks "and lines, by Britiſh ſubjects, and brought to "London or Weſtminſter, for public ſale, be- "tween May 1762, and the end of Auguſt fol- "lowing, and in ſaleable condition, fifty ſhil- "lings.

"Likewiſe, for every hundred turbots under "ſixteen inches, and not leſs than ten inches from

" eye to fork, caught and brought as aforeſaid,
" twenty-five ſhillings.

" The ſaid premiums, of fifty ſhillings, and
" twenty-five ſhillings, to be payable to the maſ-
" ter of the veſſel, within one month after the
" abovementioned four months.

" But it is provided, that in caſe the general
" quantities taken during the time abovemention-
" ed, of four months, ſhould be entitled, on
" the whole, to more than five hundred pounds,
" the Society then limit the premiums aforeſaid
" to that ſum; and, in ſuch caſe, the ſaid ſum
" of five hundred pounds, ſhall be divided in pro-
" portions, according to the quantities and ſize
" caught by each veſſel." No alteration took place in this advertiſement, till the year 1764, when the Society augmented the premiums: " of-
" fering then, five pounds, under the ſame re-
" ſtrictions, for the firſt quantity, and two pounds
" ten ſhillings for the ſecond, of a different ſize." It was in this form continued to 1766; and then dropt.

Theſe premiums have never been claimed. Though, it has been ſaid, attempts have been made; and by the ſame methods as the Dutch employ. Poſſibly they did not ſucceed, from the want of experience, or habitual ſkill, which is ſometimes requiſite in the practice of ſuch matters, even where the general method is known. The Society, however, are now poſſeſt of a complete apparatus, and inſtructions for the management of it: which are kept for the aid of ſuch as are deſirous to make further attempts. There is a gentleman in the North of England, of an enterprizing ſpirit, and well ſituated for ſuch an undertaking, who has lately deſired a model of the appa-

ratus. As he does not want perſeverance, which is principally requiſite to ſucceſs in this deſign, it is probable, that, with this aſſiſtance of information from the Society, he will effectuate their views: and the public will at length, through their means, obtain the benefit of this important acquiſition.

The Society, alſo, attempted to introduce *the preparation of* STOCK-FISH *in the Britiſh dominions.* Stock-fiſh is cured, by the expoſure of fiſh to the air in ſtrong froſts, without ſalting. It will keep for a long time: and, being in a great degree free from ſalt, has an advantage, in that particular, with reſpect to the health of ſeamen, over the common kinds of cured fiſh. It is much in uſe among the ſeamen of the northern parts of Europe; and would certainly be advantageous to ours, if they could be brought to like it. The Society, therefore, advertiſed, in the year 1762, the following premium, with the directions for curing ſtock-fiſh.

" To every perſon, who ſhall, before Decem-
" ber 1764, import into the port of London, any
" quantity, not leſs than one hundred pounds
" weight, of good and merchantable ſtock-fiſh,
" cured by Britiſh ſubjects, in any part of his ma-
" jeſty's dominions in Europe or America, and
" ſhall produce a ſample thereof to the Society,
" not leſs than ſix fiſh, the ſum of fifteen guineas;
" but, in caſe, there ſhall more than ſix candi-
" dates offer for this premium, then the ſum of
" one hundred guineas, only, will be equally di-
" vided among all the candidates.

" *The Method of Cure.*

" The fiſh, being caught in winter, muſt be
" beheaded and gutted, and the blood carefully
" ſqueezed and cleanſed from the back bone; then
" waſhed

" waſhed in ſalt water, and hung up in ſheds, to
" be kept free from wet; and there to be frozen
" till they are perfectly dry."

This premium was thus offered to 1766; and then diſcontinued.

This premium has not been claimed; nor, as far as appears, any attempt made to the gaining it. The reaſon for this is, that our ſeamen ſhew a diſlike to ſtock-fiſh; probably from their finding it more inſipid than ſalt fiſh, to the taſte of which they are habituated. A total diſcouragement ariſes hence to any undertakings to prepare ſtock-fiſh: as it would be producing a commodity, for which there is no vent with us. It is to be regretted, however, that there is ſuch an obſtacle to the views of the Society, with reſpect to this matter: which would have procured advantages, in more ways than one to the public.

The *propagating* SCOLLOPS *or* FRILLS, was, alſo, encouraged by the offer of a premium from the Society. The intention was to produce this kind of ſhell fiſh, by making them breed in artificial beds; as is practiſed in the caſe of oyſters. The occaſion of ſuch a premium taking place, aroſe from a propoſal made by a member, to attempt the increaſe of fiſh in general on the ſea-coaſt, by ſtocking each part with ſuch kinds as are not now found there: which, he preſumed, would cauſe their breeding, and multiplying in the places where they were thus carried. The practicability of doing this with ſucceſs, was diſputed by ſome; and maintained by others. It was, however, in a general light, too much a matter of ſpeculation for the Society to enter into: and, therefore, they confined their regard, to the purſuing it in this one inſtance of the ſcollops; which, being a heavy ſhell

fiſh, could not remove again eaſily from the place where they were required to ſtay and breed, whatever diſpoſition they might have to do it.

The Society, accordingly, in 1763, advertiſed, that "a premium of thirty pounds would be given to "the perſon, who ſhould eſtabliſh a bed and lay "alive therein, the greateſt number of ſcollops or "frills, of the large eatable kind, not leſs than "three thouſand, in any river, creek, or part of "the ſhore, not further from London than fifteen "leagues beyond Sheerneſs, or ten leagues beyond "Harwich.

"For the next greateſt number, placed in a "bed, in like manner, not leſs than two thou-"ſand, twenty pounds."

Theſe advertiſements were diſcontinued the next year.

There never was any claim made on the Society for this premium. Though, from the price of ſcollops, there ſeems reaſon to believe, it might have been gained with advantage to the undertakers: whether with any to the public, or not, the conſequence alone muſt have determined. As it would have depended on the propenſity or repugnance in the nature of this fiſh to breed in beds; and on the reliſh, or indifference, that might have prevailed for it, if it had been produced in great quantity.

SECT.

CT. VII.

ements that do not properly fall within the foregoing Claſſes.

BESIDES the above enumerated improvements in arts, or commerce, which the Society have endeavoured to promote by premiums, bounties, or purchaſes, there are ſome few others, that do not fall within any of the claſſes or diviſions obſerved in the preceding inveſtigation.

The encouraging MAPS *to be made of the ſeveral* COUNTIES *of* ENGLAND, *by actual ſurveys, with the latitudes and longitudes, the ſea-coaſts and bearing of the head-lands in the maritime counties, and the levels and ſections of rivers capable of being made navigable*, was embraced as a proper object of the Society's efforts. The importance of this purſuit, both with reſpect to the particular counties, and the furniſhing materials for a complete map of all England, are too obvious to require any elucidation. The nature of this ſubject rendered it not proper to offer a premium of competition. Since the labour and expence of the candidates, had there been ſeveral, would have been very injurious to thoſe who had not gained the premium: and perhaps even to thoſe who had gained it: as the rivalſhip in ſale of ſeveral maps of the ſame kind, would have diminiſhed the profit ariſing from ſelling them. The Society therefore very rightly deviated, from their general method of proceeding, in this caſe; and gave notice, they would enter into engagements, with any particular perſon in each county, who, being duly qualified, ſhould firſt offer, that they would pay a

ſtated ſum to him when he ſhou
a map of ſuch county to their ſ
Accordingly, in 1762, they pu
ing advertiſement:

"The Society propoſes to give a ſum
"ceeding one hundred pounds, as a gra
"any perſon, or perſons, who ſhall make
"curate ſurvey of any county upon the ſcale
"one inch to a mile: the ſea-coaſts of all mari-
"time counties, to be correctly laid down, toge-
"ther with the latitudes, and longitudes: and
"they deſire to be underſtood, that they do not
"intend, by this advertiſement, to bind themſelves
"to any particular time for paying the ſame gra-
"tuity, that they may be better able to procure
"ſatisfactory proofs of the merit of ſuch perform-
"ance: and, if any perſon, or perſons, do propoſe
"to make ſuch ſurvey, they are deſired to ſignify
"their particular intentions before November,
"that the Society may not engage in greater ex-
"pences than ſhall be found convenient.

"As a farther encouragement, the ſurveyor that
"will give an exact, and accurate level, and
"ſection, of the rivers in any county ſurveyed,
"that are capable of being made navigable, ſhall
"be entitled to an additional gratuity."

The advertiſement was continued thus to the year 1766, excepting that, in 1764, the following were inſerted after the words, "*ſea-coaſts*," viz. "and "the bearing of the headlands from each other."

In 1763, a claim was made, according to an engagement previouſly entered into by the Society, for a ſurvey of the county of Dorſet; and allowed. There was another allowed in 1765, for a ſurvey of the county of Devon. And, in 1767, there was a third, for a ſurvey of the county of Derby.

The

e thus procured to the public, ...ts of the counties of Devon, Dorſet, ...y, with the requiſites demanded in their ...ements; and, though they have diſcon- ...eir advertiſements, to prevent too great a ...ity of appli...ons, and avoid appropriat- ... great a part of their funds to one object; ... it is probable, that an offer from any perſon well recommended, to make a map of one of the remaining counties, would meet with attention. At leaſt, the example is ſet, and the utility diſplayed, by the maps already obtained: and this alone may poſſibly procure the reſt to be performed, by the aid of private ſubſcriptions, and the encouragement of the gentlemen in the reſpective counties.

The *importation of* DEAL BOARDS, PLANKS, *&* LOG *from our American colonies*, was, in the year 1761, propoſed as a proper object of the Society's encouragement. The evident importance of it, neceſſarily engaged their attention to the application made to them. It appeared, from the information of ſeveral gentlemen perfectly acquainted with the facts, as well as from actual ſpecimens produced before a committee, that our colonies afforded ſeveral kinds of fir, or pine wood, ſimilar, and equal in goodneſs to the beſt red or yellow deal, furniſhed to us from the northern parts of Europe. And alſo, that, at preſent, none but the white or inferior kind of deal was imported to us from our own dominions. The evident advantage of bringing the kinds that would produce a higher price, with the ſame expence of freight and labour, evinced it to be a matter, which merited, that ſome meaſures ſhould be purſued to give a due information of the circumſtances, to thoſe, who were properly ſituated to engage in this ar-

ticle of commerce. But, on [illegible] frame a proper advertiſement, it appea[red] the names of the reſpective kinds of deal [were] much in different provinces of the coloni[es] had ſo little relation to thoſe known here, [that] thing diſtinct could be ſettled, as an obje[ct] premium. The intention of offering any [premium] therefore ſuſpended: and it was reſolved, inſte[ad] of that meaſure, to ſend ſpecimens of the kinds of deal in uſe here, with an account of the ſeveral prices of them, to each of the ſettlements where, it was preſumed, the exportation of the correſpondent kinds might be moſt beneficial. The deſign of this communication was, that general information being thus offered of what kinds of deal were demanded here, and of the prices at which they could be vended, an incitement, from the view of profit, aſcertained by ſuch clear facts, might be furniſhed to thoſe, who had the means in their power to enter into this trade: ſo advantageous, moreover, to the public intereſt, both of the colonies and ourſelves, if the very great ſums paid to foreigners for timber, could be transferred to our American planters. This proceeding has not, nevertheleſs, appeared to have been followed with the ſucceſs, that might have been expected from it. The reaſon of which, there is ground to believe, has lain principally, in the neglect of duly expoſing the ſpecimens to the public in the colonies, by thoſe to whom they were ſent. Certain it is, that very great benefits, which might ariſe to the whole Britiſh community, from the ſettling this article of commerce on a proper footing betwixt the colonies and ourſelves, are loſt at preſent: and, as there is great reaſon to believe, merely from the want of the requiſite information, and attention. The So-

ciety,

this matter to the bottom, endea-
by the moſt rational and feaſible means,
the impediments to it. If they have
his end, from the deficience of zeal in
rs, whom it more immediately concerned to
the laudable views, the public, as well
the Britiſh as American members of the communi-
ty, ought yet to entertain a due ſenſe of obliga-
tion to them.

There was another object, of the ſame nature with the preceding, to which, alſo, the Society have been induced to lend their attention. Application was made to them, in 1766, from ſeveral coopers in very extenſive buſineſs, to give aſſiſtance in promoting the *importation of* PIPE STAVES *from America, in the place of thoſe now brought from Germany.* It appeared, on very good authority, that the quantity we take from Germany, principally from Hamburgh, amounted to a very great national expence: and that the white oak, produced in Canada, was equally fit for the purpoſe, when properly treated; and could be afforded cheaper. But that an ignorant and injudicious management, with reſpect to the ſeaſon for felling the timber, the curing it, and the dividing it, rendered the ſtaves unfit for the uſes, to which thoſe kinds from Germany are applied. The committee, to which this matter was referred, being ſatisfied, that the giving juſt information on this head, to thoſe, who, from the want of it, loſt the advantages they had otherwiſe in their reach, might be of great ſervice, aſſiſted the coopers in ſettling a brief ſet of directions, in the following manner.

" The ſtaves imported from Germany, by the " way of Hamburg, Stettin, and Dantzick, take " from the port of London annually, at leaſt one

" hundred

" hundred thouſand pounds: and it h
" ly found, that the Quebec oak, mad
" with a little care in the cl aving and pre
" will anſwer all the purpoſes of the Germ A
" it will promote a conſiderab e ſaving, as w as en-
" courage greatly our own colonies, it is rec
" mended to them, and the merchants here, to
" take into their conſide ation the manufacture and
" importation of the ſame, according to the Ger-
" man plan.

" For their immediate direction, and for the bet-
" ter promoting th ſame, the particulars are annex-
" ed, as to ſize, &c. of the timber required from
" Quebec, and other parts of America. Any quan-
" tity of the ſame, correſponding with the fol-
" lowing directions, will meet with a ready ſale,
" and turn to profitable account.

" To wit, pipe ſtaves, five feet ſix inches long,
" from five to ſeven inches broad, and one inch
" and a half thick at the thin edge.

" Hogſhead ditto, four feet ſix inches long,
" breadth, &c. as above.

" Barrel ditto, three feet ſix inches long,
" breadth, &c. as above.

" Heading, two feet ſix inches long, and as
" broad as poſſible.

" The above muſt be all of white oak, free
" from ſap and worm-holes. The greateſt quan-
" tity wanted will be of thoſe of four feet ſix inches
" long.

" *Directions for cleaving the Staves.*

" The trees are to be felled in winter; and,
" after being cut into the proper lengths, muſt be
" quartered, and the ſtaves cleft from the quar-
" ters, after the thin edge is taken off, which is
" the center of the tree; that part being not fit
" for uſe.

" The

his business, per method of quartering should be paringularly observed; which is by dividing the [illegible] pod into four parts, by lines drawn as *radii*, from the center, at equal distances. The common method, of dividing the wood by parallel lines drawn cross the whole, from one side of the wood to the other, should be avoided.

"Note, The timber which comes from America, in general, is rarely fit for any other purpose than to make into dry casks: being commonly red and black oak, cut too short and irregular, cleft too thin, and with the sap not taken out. Therefore, all the abovementioned timber being intended for tight cask, must be the best white oak; and being strictly conformable to the above directions, it will produce a price accordingly."

It was, moreover, recommended to the Society, by the same committee, to print these directions; and disperse them in America. But some gentlemen particularly interested in the affairs of the colonies, proposing to procure them to be inserted in the gazettes or journals published in America, the design of printing and sending them from hence was not carried into execution. How far this information has been diffused by the method proposed, does not appear from any further intelligence hitherto had of the event. But there can be no doubt of its beneficial effects, if the due means has been pursued. It were, therefore, to be wished, the Society had not trusted the affair wholly to the care of others: but joined their own endeavours to communicate this matter to the proper people, by dispersing a number of these papers in the colonies: particularly in Quebec.

There

There was another important object [illegible] was found ciety's purſuit, of which, they ſought the [illegible]ediate ment of the end, without regard to any premium or bounty. This was, the procuring to the public, the benefit of a *method of* EXTINGUISHING *accidental* FIRES *in houſes*. There had, at the time this matter was ſtarted, lately been an uncommon number of ſuch accidents: and a member of the Society, ſince dead, who had great zeal to do ſervice to the public, had met with a pamphlet treating of a method of extinguiſhing fires. Finding it had been proved, by experiments publickly made, to be effectual, not only in the beginning of fires, but even when they have made ſome progreſs, he thought it might be rendered advantageous to the public, by being made known through the means of the Society. The extinction of the fires was performed by the uſe of balls, charged with explosive matter, and a fluid that has the property of damping fire; and provided with a match to fire the contents. Theſe balls were to be thrown into the room on fire; and, burſting there, produced the effect, by their exploſion, and the action of the damping fluid, which was diſperſed by the exploſion over the whole ſurface of the room, and quenched the heat. The pamphlet had been publiſhed by Mr. Godfrey, an eminent chemiſt, who introduced this method here; and had obtained a patent for the ſale of the balls. The Society had theſe facts laid before them; and the pamphlet was produced and read to them: by which, as the method propoſed appeared of very great conſequence, and from good authority to be efficacious, they were determined to uſe their endeavours to bring it into practice. They were further informed, that the grandſon of Mr. Godfrey, who had ſucceeded in his

[illegible] was master of the knowledge of pre-[illegible] these balls; and even had some of them in [illegible]ssession. On this intelligence, they formed a design of having the experiments tried before the public at large; and applied to Mr. Godfrey for his concurrence and assistance. He consented to furnish, at his own expence, the balls that should be wanted; and to attend and conduct the management of them. It was then resolved to build a proper edifice, at the Society's expence, three stories high, near some extremity of the town; which, being set on fire, might give a full opportunity of observing the effects of the operation of the balls. This was accordingly done, at a little distance from the end of Tich-field street, near Marybone; and the building being finished, a quantity of wood, faggot, and shavings, were put into the rooms of the ground floor and first floor. Fire was then set to the combustibles, in both rooms at the same time; and when they had taken hold of the wainscot, the balls were thrown in; and had immediately their due effect. A part of the spectators, the whole being very numerous, who were not near the building, and, consequently, did not perceive how much the fire had gained upon it, before the balls were thrown in, expressed some dissatisfaction and doubt, whether the trial was fair, or sufficient. On which, it was resolved to repeat it in the uppermost room. This second time, the fire was suffered to prevail in such manner, not only on the combustibles put into the room, which were in a copious quantity, but on the wood of the building itself, that the flame came strongly out of the chimney, and forced its way with great violence out of the windows. But, instantly, on the explosion of one ball thrown in, it entirely disappeared: and,

on

on that of a ſecond, not a ſpark of fire ... unextinguiſhed by the ſpectators, who imm... ly went into the room. The flooring was burn through: and the wainſcot reduced to coal in many parts. This removed every ſurmiſe of doubt of the efficacy of the operation: and the Society confirmed, afterwards, the reſolution the committee then paſſed, "that the experiment had anſwered, "to the full ſatisfaction of every body." There can be no queſtion made, but that this method will extinguiſh fires in the beginning, and, in many caſes, even after they have burnt ſome time. The only difficulty is, how to procure the balls, at the times they are wanted. The Society intended, by this public demonſtration of their efficacy, to induce, at leaſt, ſuch as are particularly liable to accidents of fire, to provide themſelves with them: as there are many caſes, in which they might have been uſed with ſucceſs. But, notwithſtanding what they have done, and Mr. Godfrey's advertiſing the balls after this trial, very few have taken them. But when fires happened at that time, the populace called on Mr. Godfrey to attend with them himſelf. But, as fires are caſualties, that do not threaten particulars enough to ſtrike the multitude with a ſtrong ſenſe of apprehenſion, by degrees the whole of this exhibition of a remedy ſeems forgot. The Society, however, have ſhown to the public, that there is an eaſy method, by which fires may be extinguiſhed, in many circumſtances, though not in all: and it is to be regretted, that their generous endeavours for the public ſafety are not ſeconded, by ſome proviſion's being made for the application of this method on the proper occaſions. If the balls were kept in ſome proper places, in each pariſh, as engines and buckets are,

ere, where recourſe could be quickly had to them on any emergency, they might certainly be rendered preventive of ſome of thoſe fires, that are extremely calamitous, and now ſo frequent.

SECT. VIII.

CONCLUSION.

ON the reviſion, which has been above made of the Society's proceedings, with regard to the number and choice of the ſubjects of encouragement in the ſeveral claſſes; the reſpective meaſures purſued for the attainment of the end; and the effects or conſequences of thoſe meaſures; it muſt be admitted, by every candid examiner, that their endeavours, and ſucceſs, have been equally great with their plan; even conſidered according to the moſt extenſive meaning conveyed by their title, of a *Society for the encouragement of arts, manufactures, and commerce.* The extraordinary progreſs, ſo conſpicuous to all, of the improvements in the *polite arts*, proclaims itſelf, how much has been effected in the concerns of that claſs.—The introduction, or advances of the cultivation of madder, lucern, burnet, the ſeparated graſs ſeeds, &c; the information, obtained, of the more expedient and profitable methods of culture in general; and the invention, or improvement of the drain plough, drill plough, ploughs for various other material purpoſes, chaff-cutter, machine for ſlicing turneps, and other important inſtruments, or utenſils, ſubſervient to huſbandry, evince ſtrongly, the benefits gained with relation to the articles that fall within the claſs of *agriculture.*—The invention, introduction, or improvements of making

carpets, crapes for hat-bands, and chip-hats like the Italian, marbling and emboſſing paper, quilting in the loom, knitting lace and lace mits or gloves; and other valuable arts or manufactures; as alſo, of thoſe important machines, the crane, ſaw-mill, ſtocking-frame, tide-mill, wind-mill, ſpinning wheels of various kinds, machine for doubling worſted thread or cotton, comb-pots for wool-combing, cyder-preſs, ſilk-reel, &c; manifeſt amply the advantages procured to our commerce, in the claſs of *mechanical arts*.—The acquiſitions relative to the preparing in England, verdigriſe, varniſh, zaffre, ſmalt, and white enamel; the making crucibles of both kinds; edulcorating train oil; dying cotton, and linnen; tanning leather with oak ſaw-duſt; and dying leather red and yellow, in the Turky manner; are inſtances how much the public intereſt has been promoted in the claſs of *chemical arts*.—The eſtabliſhment in our American colonies, of the manufacture of pot-aſh and pearl aſh; the introduction of that of barilla; as likewiſe of the cultivation of vines, both European and indigenous or native; conſtitute a moſt eſſential ſervice done to the Britiſh community, in the claſs of *trade*. But theſe are only the more ſtriking articles, ſelected from others, which might be enumerated, to demonſtrate, how much the Society's encouragement has conduced to bring forth matters of the higheſt public utility.

They have now a much greater multiplicity of conſiderable objects in view, than ever before; as appears by their liſt of premiums for the preſent year: and the means by which they can operate for the attainment of them, are now, in conſequence of experience and accumulated information, much better underſtood, and regulated.

They

They have inſpired an ardent ſpirit of general purſuit of improvements, as well as a keen attention to the diſcovery, or rendering perfect, many particulars which have already been brought into agitation. The future benefits of their yet unremitted efforts, will, nevertheleſs, in all probability, exceed thoſe already reaped.

The grounds of expectation of future benefit from the Society's endeavours, will be, however, more ſatisfactorily elucidated, by the explanation of the ſeveral articles, that now ſtand in their liſt of premiums; which will be given in the next volume of theſe Memoirs. This explanation will not only extend to the general nature of each ſubject, and the reaſons which induced the Society to adopt it; but will comprehend, in moſt caſes, inſtructions, or intimations, relative to the probable means by which the matter propoſed may be effectuated. This, it is hoped, will much facilitate the operation of the premiums offered, and the conſequential attainment of the object: and will, alſo, together with an account of the determination of the reſpective claims, and of other occurring applications for encouragement, form a continuation of this hiſtory of the Society.

ARTICLE IV.

Experiments, and Obſervations on the DRILL *and* BROAD-CAST HUSBANDRY; *and on the Culture of* Corn, Pulſe, Turneps, Lucerne, Saintfoin, Burnet, &c. *communicated to the Society for the Encouragement of Arts, &c. in four Letters, by Sir* Digby Legard; *and inſerted at their Requeſt* *.

To *Robert Doſſie*, Eſq;

SIR,

THE Society for the Encouragement of Arts, Manufactures, and Commerce, have directed me to deliver to you Sir Digby Legard's letters, in order to their being publiſhed in the Memoirs of Agriculture, if you think proper.

By Order,

PETER TEMPLEMAN.

* The firſt of theſe letters was ſent in claim of the Society's gold medal offered as a premium for the beſt ſett of experiments and obſervations to determine the comparative utility of the Drill and Broad-caſt huſbandry applied to barley: which was accordingly adjudged to Sir Digby Legard.

To

To the Society for the Encouragement of Arts, Manufactures, and Commerce.

GENTLEMEN, 1763.

THE following experiments on barley, executed laſt year, together with an account of different methods of cultivating that grain, are offered you by a candidate for your ſixty-ninth premium. I preſume, my having given the ſubſtance † of theſe experiments to Mr. Mills, to be inſerted without my name in the laſt numbers of his Book on Huſbandry, will not be thought an objection to my offering the ſame to you on this occaſion.

I wiſh it were in my power to determine preciſely the moſt profitable method of culture: but ſince ſeveral years experience, and the moſt careful obſervations I have been able to make, have not been ſufficient to clear up my own doubts, I ſhall not preſume to dictate to others; or to ſpeak very poſitively on ſo nice a ſubject: I would reject the moſt plauſible theory, if unconfirmed by experiments. And even experiments themſelves, if they are not executed with care; often varied in different

† What is ſaid here of the publication of *the ſubſtance of theſe experiments in Mr. Mills's Syſtem of Huſbandry*, relates only to the firſt letter. The contents of the three ſubſequent ones have not been before publiſhed.

ſoils, ſituations, and circumſtances; and repeated ſeveral years; are too apt to miſlead. It is both a very important, and difficult taſk, which the advocates for the new huſbandry have undertaken, to overthrow intirely the old ſyſtem of fallowing, and dung; nay even the more modern introduction of turneps and clover (a ſyſtem which the induſtrious farmer has long found abundantly ſufficient, if not to acquire riches, at leaſt to enable him to maintain his family); in order to introduce the more faſhionable ſcheme of pulverization; aſſerting confidently, that nothing more is neceſſary in order to create an immenſe, and laſting fertility, in almoſt every ſoil, than thoroughly to break and divide the earth. But the aſſertors of a new doctrine are apt to be too ſanguine. Let us beware of being impoſed upon by novelty; or of preferring ingenious to uſeful diſcoveries. I am the more inclined to communicate to you theſe experiments of laſt year: becauſe I think the compariſon leſs favourable to the new huſbandry in that, than any other years wherein I have made experiments. For I would allow every advantage to old cuſtoms, that they can naturally or reaſonably claim.

Five acres of an incloſed field, the ſoil of which is naturally pretty rich, but light, and dry, inclining to a hazel mould, and nearly of equal goodneſs throughout, was deſtined to be ſown with barley: part according

cording to the old, and part to the new method of huſbandry, in order to aſcertain the moſt advantageous method of culture. This land had borne four ſucceſſive crops, viz. one of barley, two of wheat, and one of turneps; was diſpoſed in beds from the firſt; and had been horſe-hoed every year; but it had never had any manure; except that the turneps had been eaten off by ſheep. On the 26th of April 1763, half an acre was ſowed by hand, in the random way; and took five pecks of ſeed: and half an acre was drilled, in equal diſtant rows, one foot aſunder; and took three pecks. Two acres were drilled on ridges or beds, five feet broad, in double rows, eleven inches aſunder, and four feet one inch interval to be horſe-hoed; and they took ſix pecks. Two other acres were drilled, on five feet ridges, in treble rows, ſeven inches aſunder: and took four pecks.

N. B. I feared, at the time of ſowing theſe laſt two acres, that the ſeed had been too ſparingly diſpenſed: but the plants branched ſo much afterwards, that the rows ſeemed tolerably compleat.

The above five acres had but one plowing: viz. juſt before ſeed-time after the harveſt, 1762. On the 30th of May, the firſt horſe-hoeing was performed, on the four acres, ſowed in ridges, with M. Du Hamel's one-wheeled plow. But, on account of the rows being drilled unevenly,

this could not be done very regularly in ſome places: the plow coming ſo near the rows as to tear out ſome plants, and cover others with mould; and in others going at too great a diſtance from the corn. To remedy this, in ſome meaſure, the rows ſo covered had the earth raked off; and another horſe-hoeing was given on the 7th of June; the earth being very dry. By this laſt operation, the firſt furrow was cut deeper: and the plow went at a proper diſtance from the rows. On the 8th of June, all the five acres were hand-hoed. But, by reaſon of the dry ſeaſon, not many weeds had ſprung up. The effect of the horſe-hoeing on the four acres was great: and the corn ſeemed to flouriſh exceedingly. The plants were of a deep green; and remarkably vigorous. The part drilled in equally diſtant rows without intervals remained always of a paler green. But the part ſown in the common way was a degree ſtill paler; tho' this laſt part ripened the earlieſt; the drilled half acre next; and the four horſe-hoed acres laſt of all. The third, and laſt horſe-hoeing was performed in the beginning of July. This turned the earth towards the rows; and left a furrow in the midſt of the intervals.

On the 31ſt of Auguſt 1763, the half acre ſowed by hand, and the half acre drilled in equal diſtant rows, were mowed. The firſt produced twenty-ſeven ſtocks; the latter

latte thirty-one ſtocks and eight ſheaves: and the ſtraw was ſtronger, and the ears larger, in the latter than the former. On the 15th of September, the four acres, that had been horſe-hoed, were mowed. The ears were far from being equally ripe, becauſe the extreme wet ſeaſon had cauſed ſeveral freſh ſhoots at the time, the firſt, and principal, were ripening. The two acres drilled with treble rows produced ninety-four ſtocks and four ſheaves. But the ſeed was ſowed too thin; and, in conſequence, there were ſeveral vacant ſpaces in the rows: and this was certainly ſome diminution of the crop. The two acres drilled with double rows produced ninety-five ſtocks. The ears of barley, throughout the four horſe-hoed acres, were ſurpriſingly large. Several contained thirty-eight grains each (which is uncommon, at leaſt in my neighbourhood). I believe the number of grains, in an ear, were, at a medium, about thirty.

The many violent ſtorms of wind, and rain, had lodged the corn in many places. I had ſome barley, this year, ſown by hand on freſh and good land; which was ſo lodged in thoſe places, where the land was the richeſt, and the corn thickeſt, that the greateſt part was waſted. Nevertheleſs, though the horſe-hoed barley inclined every way, owing to ſtorms, in various directions; and intirely covered the four intervals, ſo that no land

could be ſeen; yet were the ſtalks only bent, but no ways injured: and this is one great advantage, which horſe-hoed corn has over that ſowed at random. For, though the ears are very large, the ſtems are proportionably ſtrong, and hard; and, being conſtantly expoſed, by means of the broad intervals, to the influence of the ſun and air, they acquire ſuch a degree of firmneſs, as generally to reſiſt all attacks of wind and rain. The only inconvenience attending thoſe bent ſtalks was, that they were difficult and aukward, to mow; and, by covering the intervals, prevented their being ſown; and deprived me of a good crop of turneps. For I have generally ſown turneps in the intervals, immediately after the laſt horſe-hoeing, about the beginning of July. The land is then reduced to excellent tilth; and nothing more is neceſſary, than to ſow the ſeed pretty thick. The firſt ſhower of rain waſhes it into the ground, and covers it, without the aid of the harrow. The young plants enjoy the benefit of the freſh tilled earth; and, the corn being reaped, ſoon afterwards, the whole field is left for the turneps to extend their roots in it. I have had near as good crops of turneps this way, as when the land was occupied by that plant alone. On the 22d of September the produce of thoſe parts, ſown by hand, and drilled in equally diſtant rows, was threſhed; and yielded as follows; viz.

Twenty-

	Qrs.	Bu.	P.
Twenty-ſeven ſtocks of the half acre, ſown by hand, yielded	2	7	2
Thirty-one ſtocks and eight ſheaves of the half acre, drilled in equal diſtant rows	3	1	

December the 17th, the produce of the four horſe-hoed acres was threſhed, and yielded as follows: viz.

	Qrs.	Bu.	P.
Two acres ſown with treble rows, produced ninety-four ſtocks four ſheaves, yielding	6	2	0
Two acres ſown with double rows, produced ninety-five ſtocks, yielding	6	3	0
It appears, from the above experiment, that four acres drilled, and horſehoed, produced	12	5	0
Deduct for the quantity of ſeed ſown, viz.	0	2	2
There remains, net produce on four acres	12	2	2
Half an acre ſown at random produced	2	7	2
Deduct for the quantity of the ſeed ſown,	0	1	1
Remains net produce on half an acre	2	6	1
Half an acre drilled in equally diſtant rows, produced	3	1	0
Deduct for the quantity of ſeed ſown	0	0	3
Remains net produce on half an acre	3	0	1

Perhaps the difference may appear more clearly, if ſtated in the following manner, viz.

	Qrs.	Bu.	P.
Old method, total net produce of one acre is	5	4	2
Total net produce of one acre, ſown in equal diſtant rows	6	0	2
New method, total net produce of one acre drilled and horſe-hoed	3	0	2

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In the above experiment, it is to be obſerved, that the land of both theſe trials was, as nearly as poſſible, of equal goodneſs, and in equal order, lying contiguous in the ſame field. The ſeed-corn of both was exactly the ſame, and all ſown on the ſame day. So that the difference in the produce of each acre muſt be attributed to the quantity of ſeed ſown, the manner of diſtributing that ſeed in the earth, and the culture beſtowed on the plants whilſt growing. It is evident, however, that the land in the old produced nearly double to that, which was cultivated in the new way. But the greateſt produce was from the land ſown with the drill plow in equally diſtant rows, one foot aſunder: Yet are we not from hence to determine too raſhly in favour of either method.

I own from the appearance of the crop, whilſt growing; and even after it was reaped; I did expect, that the quantity from the four horſe-hoed acres would have been more conſiderable. Indeed I can account for ſome diminution of the crop, from the following accidents, viz. The horſe-hoed corn ripened unequally, owing (as was before obſerved) to the exceſſive wet ſeaſon; and, as it was later reaped than the other, it was more expoſed to the depredations of ſparrows, and other birds, which certainly got part of it. And, being firſt carried into a Dutch barn, and removed ſome time afterwards into a common barn to be threſhed, there was not only a loſs by

by ſcattered ſeed in the removal, but, likewiſe, by pigeons, which devoured a good part: having a conſtant and free acceſs to the tops, and ſides of the barn, where it was firſt depoſited. Whereas, the produce of the parts, cultivated in the old way, and drilled in equally diſtant rows, was carried into the barn, and threſhed immediately; and, therefore, not liable to the ravages of vermin, or to any other loſs.

But it muſt be allowed, notwithſtanding, from this experiment, that the advantage appears to be on the ſide of the old method. On the other hand, although ſix quarters on an acre is confeſſedly a very large increaſe from land ſown in the common manner, yet is it no leſs true, that this great fertility was, in a conſiderable meaſure, owing to the excellent culture beſtowed on it by the horſe-hoeing method. Conſtant tillage, during the four preceding ſummers, had undoubtedly ſupplied the place of manure: and four ſucceſſive crops, which were none of them bad, were ſo far from having exhauſted the earth, that there ſeemed to be an increaſe of vegetable food. The ſoil appeared ſo thoroughly divided, that, ſince the harveſt of 1763, the above four acres have been drilled with wheat at once plowing; and promiſe a good crop: the ridges being now where the furrows were laſt year. But thoſe parts, which were ſown at random, and in rows, have been ma-

nured

manured at the rate of ſixteen loads of ſtable dung to one acre, in order to recover their loſt fertility: and it was neceſſary to ſow ſome kind of meliorating crop, to make this part of equal goodneſs with the reſt of the field. It has accordingly been plowed into five feet ridges; and drilled this April with white peas, a double row on each bed; and is intended to be horſe-hoed.

I cannot help obſerving here, that, were I to follow M. De Chateauvieux's method (although in moſt inſtances I am proud to follow the example of ſo able an experimenter); and compute the produce of ſeveral years on the footing of the above horſe-hoed crop; reckoning the land in the old way, to bring a crop only once in two years; the advantage would be greatly in favour of the new method: even ſuppoſing every crop, in the old, at the rate of ſix quarters to an acre. For the expence of manure and tillage in the fallow year are infinitely greater than the horſe-hoeing expences. But if England be ſo much ſuperior to Swiſſerland in goodneſs of ſoil; or if our farmers are ſo much more ſkilful than theirs, that we can, in the common management, I mean the riſe of turneps, clover, rape, &c. have a beneficial crop every year; I ſhould be inclined to doubt, whether the very ſuperior advantages, which ſome writers attribute to the horſe-hoeing huſbandry, may not be more imaginary than real. Not but that

but that I think, there are ſeveral circumſtances to recommend it; and that it may be followed in ſome ſituations to great advantage. As where the difficulty of procuring manure is very great: or where the diſtance of the plowed field from the farmer's habitation would make the carriage too expenſive. There are, alſo, ſome ſoils more peculiarly adapted than others to the new huſbandry; as requiring an extraordinary degree of pulverization; and ſome vegetables are particularly improved by beſtowing a culture on them whilſt growing.

I ſhould, therefore, be concerned to find, that any one was deterred, by what I have ſaid, from making, or continuing their experiments in the new huſbandry. My experience is much too ſmall to determine abſolutely the comparative excellence of the two methods.

I have, however, ſo good an opinion of Mr. Tull's ſyſtem, that I have already continued the practice of it for five or ſix years; and have tried it on ſeveral kinds of vegetables; and in a pretty extenſive manner. I propoſe to continue my experiments, to extend, and to vary them. Perhaps, at laſt, I may be able to aſcertain, whether, or no, the horſe-hoeing ſcheme be ſuperior; and in what degree.

There is one prejudice commonly adopted againſt this method, by the inexperienced, viz.

viz. that it is very expenſive; which is entirely groundleſs; as will appear by attending to the following particulars. The two-wheeled drill-plow, invented by Mr. Tull (which I can recommend as a good inſtrument, having had ſeveral years experience of it; and ſome hundreds of acres drilled with ſucceſs), may be made complete with wooden ſeed-boxes for fifty ſhillings. Mr. Duhamel's one-wheelled plough for horſe-hoeing coſts thirty ſhillings. But this laſt, though very uſeful, is not abſolutely neceſſary. For the common plow, without wheels, will perform all the operations of horſe-hoeing. Thoſe two inſtruments may be eaſily made, and repaired, by a country wheelwright. I have ſeveral made in the village where I live, at the aforeſaid prices, which were very perfect; and have laſted ſeveral years. It is true, I make uſe of ſome other inſtruments, which may be ſaid to be appendages of the new husbandry: as they have been contrived by the practitioners of it. But the five-coultered plow, the ſingle, and double cultivators, &c. though extremely convenient to thoſe, who practiſe this method in a very extenſive manner, are, by no means, neceſſary in making trials, or ſmall experiments.

After the firſt year, that is, when the land is reduced into fine order, one horſe is generally ſufficient to turn a furrow, either to or from the rows: and, as a man and horſe can,

with eaſe, horſe-hoe four acres in a day, it cannot coſt more than one ſhilling to horſe-hoe an acre; even including the repairs of the inſtruments: nor are more than four hoeings commonly required. So, if we reckon four ſhillings for plowing the ground once over, or forming freſh ridges; four ſhillings more for horſe-hoeing; two ſhillings and ſix-pence for hand-hoeing; two ſhillings for weeding; and ſix-pence for drilling; thirteen ſhillings is the whole expence of managing an acre in the new method.

Such, therefore, being the eaſe, with which this celebrated method is performed; ſo great the improvement of the land by it; and ſuch the extraordinary effects produced by merely ſtirring the earth; one would think, every huſbandman ſhould be induced to give it a fair and candid trial: and as there needs not the exaggerated encomiums, which its partizans have affected to beſtow on it, on the one hand: ſo, on the other, the inveterate prejudices, which prevail in many againſt this ſyſtem, as they have no foundation in truth, muſt prove ſubverſive of the intereſts of agriculture.

SIR,

SINCE the letter I wrote to you, in 1763, I have continued my experiments in huſbandry; and, as I think the further obſervations, I have made on the culture of barley, may render the experiments, which I ſent you

you to lay before the committee of agriculture, more complete, I beg leave, through your means, to add the following by way of ſupplement to my former letter. Not doubting but you will be careful to conceal the name of the author, until the Society ſhall have determined its merits.

Ganton, near Malton,
Yorkſhire, Nov. 1, 1765.

I am, SIR, &c.

To the Right Honourable the Preſident, and Vice Preſidents, of the Society for Encouragement of Arts, Manufactures and Commerce.

Nov. 1, 1765.

GENTLEMEN,

THE experiments, which I had the honour to lay before you, in 1763, in order to determine the moſt beneficial method of cultivating barley, were, I fear, not intirely ſatisfactory: at leaſt they were not ſo to me. I muſt beg leave, therefore, to add the following, as a ſupplement to my former letter.

However doubtfully, I might expreſs myſelf, in that letter, with regard to the excellence of the drill, and horſe-hoeing culture (not having, as I thought, at that time ſufficient experience to determine a point of ſo much importance), two years careful obſervations have ſince enabled me, to ſpeak more poſitively, and have made me incline much more to the ſide of the drill ſyſtem. Nor have my experiments been confined to barley.

barley. I have cultivated wheat, for ſeveral years, with ſucceſs; and have applied the horſe-hoeing huſbandry to beans, peaſe, oats, turneps, potatoes, ſainfoin, and lucern; and the effects of horſe-hoeing have been ſo conſtant, and uniform, in the cultivation of all theſe vegetables, that I have no doubt, but that this method, if executed with care, attention and perſeverance during a term of years, will prove much more advantageous than the old method.

The ſame field in which the experiments on barley were made (as before related in 1763), is now ſown with wheat, the eighth ſucceſſive crop. Of which four crops have been wheat. The two laſt of theſe have each produced near two quarters of wheat per acre: and the land is ſo far from being exhauſted by ſo many burdens, that it ſeems yet in perfect heart; though no manure has ever been laid upon it.

I have now practiſed the drill culture about eight years: and, from the moſt careful obſervations, I have been able to make, I judge, that twelve buſhels of wheat on an acre is about the medium quantity to be obtained from moderately fertile ground, during, at leaſt, ſix ſucceſſive years, without dung. I reckon eight buſhels to the quarter, and nine gallons to the buſhel. Now, if this be a true poſition, I think it will not be difficult to prove, that the drill culture is more

beneficial to the farmer than any other method hitherto invented.

After I have related the two laſt years experiments in barley, I ſhall give a comparative view of the expences, and profits attending the cultivation of land in the old and new way: and I ſhall calculate the profit in the old way; not according to the management in uſe, in the time of our anceſtors, but according to the beſt modern improvements: taking the account from ſome celebrated modern practitioners, as related by themſelves.

A compariſon of this ſort is not ſo properly made betwixt the old and new huſbandry, as betwixt the modern improvements, adopted by the common farmer, and the benefit peculiarly ariſing from the drill and horſe-hoeing ſyſtem. That the latter is founded on juſt principles, I am convinced: and that the practice of it (if any credit be due to the actual experiments of its profeſſors), ought to be eſteemed one of the moſt conſiderable improvements in agriculture.

On the 26th of April 1764, two acres and a half were drilled with barley on ridges four feet and a half broad; viz. a double row ten inches diſtant on the top of every ridge, the intervals for horſe-hoeing being three feet eight inches broad; and took two buſhels two pecks of ſeed. One acre adjoining, and of equal goodneſs, was, on the ſame day, drilled with barley, in equally diſtant rows,

one

one foot aſunder, and took two buſhels of ſeed. One other contiguous acre was, at the ſame time, ſown in the broad-caſt manner; and took two buſhels one peck of ſeed. All the land was as near as poſſible of equal goodneſs; of a light and dry nature; viz. a good hazle loam, worth fifteen ſhillings per acre. This field had borne a good crop of oats, viz. ſix quarters per acre, the preceding year, on once plowing.

N. B. It had been twenty years in graſs.

Two plowings had been performed ſince the oat crop: viz. one in the autumn, and the other in the ſpring. The horſe-hoed part had three hoeings given at proper times; and was once hand-hoed. The one acre drilled level could not be hand-hoed; becauſe ſainfoin had been ſown in the partitions betwixt the rows of corn: and it is to be obſerved, the want of this hand-hoeing deprived the barley of a very material advantage. The acre ſown broad-caſt was, alſo, laid down with ſainfoin; and was not weeded.

The horſe-hoed corn, as well as the level-drilled, and broad-caſt, were cut on the 18th of September.

	Qrs.	Bu.	P.
The produce of two acres and a half horſe-hoed was when threſhed	10	5	0
The produce of one acre drilled in equally diſtant rows	4	4	0
The produce of one acre ſown broad-caſt	4	2	1

The horſe-hoed crop may be eſteemed a great one: as it produced four quarters and three buſhels to an acre. The corn was alſo ſuperior in ſize and goodneſs to the other; and was ſold immediately for one pound five ſhillings per quarter. Some ears contained thirty-eight grains. This crop ſuffered a diminution from ſome horſes breaking into the field, and eating ſeveral rows, juſt at the time of its getting into ear. But, as the two other acres of experiment were injured by the corn being lodged, in ſome places, by ſtorms of wind, and rain, theſe accidents might nearly ballance each other.

On the 4th of May, 1765, the two acres and a half, juſt mentioned to have been horſe-hoed the preceding year, were again drilled with barley after two plowings, to form the ridges; and took two buſhels one peck of ſeed. Theſe were horſe-hoed, and hand-hoed; and, in ſhort, managed in every reſpect as in the former year.

This crop was reaped on the 13th of September; and threſhed the 22d of October. The produce was ten quarters of fine and clear corn, ſold at one pound two ſhillings and ſix-pence per quarter. The adjoining land, where the laſt year's experiments were made, could not be ſown this year with corn, by reaſon of its being occupied by a crop of ſainfoin; which now looks very promiſing. But I obſerve, that this year my crops

crops of barley in general, on my beſt land, do not produce more than four quarters four buſhels per acre. But, taking my barley crops at a medium for the laſt three years, the produce has been four quarters on an acre, in my beſt fields, ſown broad-caſt; and taking the horſe-hoed crops at a medium for the beſt three years, the produce has been three quarters ſix buſhels and three pecks.

In the following compariſon, therefore, I ſhall calculate each year's crop, both in the old and new way, on the above footing.

It is impoſſible to be very exact in this kind of calculations. But, I ſincerely believe, that there is greater probability of reaping four quarters on an acre, in the horſe-hoeing huſbandry, than five quarters in the common way, on ſuch a ſoil as I have made my experiments on. It has been uſual to reckon, that the farmer ought to make three rents of his land. One third of which goes to his landlord, another to the expences of cultivation, and the remaining third to the maintenance of himſelf, and family. But we will allow, that the art of huſbandry is ſo much improved, that an intelligent farmer may receive above a third clear profit. One cannot preciſely determine what the profit is; which varies probably in every county; and depends ſo much on circumſtances, and ſituation.

I ſhall, therefore, ſet down a courſe of huſbandry frequently obſerved by farmers in my neighbourhood, where the fields are incloſed, and let for fifteen ſhillings an acre, tithe free.

An eſtimate of the expence and profit of one acre in four years.

	£.	s.	d.
Firſt year, for turneps, coſts	3	16	6 viz.
Four plowings at 4 s. each,	0	16	0
Harrowing and ſeed,	0	2	0
Hoeing the turneps,	0	6	0
Fifteen loads of dung, at 2 s. 6 d. per load,	1	17	6
Rent,	0	15	0
	3	16	6
The firſt year's produce, turneps worth	2	0	0

	£.	s.	d.
Second year, for barley, coſts	1	13	0 viz.
Two plowings, and harrowings,	0	10	0
Three buſhels of ſeed barley, and weeding,	0	8	0
Rent,	0	15	0
	1	13	0
Second year's produce, four quarters of barley, at 18 s. per quarter,	3	12	0

	£.	s.	d.
Third year, for clover, coſts	0	19	0 viz.
Fourteen pounds of clover ſeed, and rent,	0	19	0
Third year's produce, two crops of clover worth	1	10	0

Fourth

	£.	s.	d.
Fourth year, for wheat, coſts	1	18	0
One plowing, and harrowing, —— —— —	0	7	0
Three buſhels of ſeed, and weeding, — —	0	16	0
Rent —— —— —— —— —— —— —— ——	0	15	0
	1	18	0
Fourth year's produce, three quarters of wheat, at 1 l. 16 s. per quarter, is —— —— —— ——	5	8	0
Total produce on four years, —— —— —— ——	12	10	0
Total expences of one acre in four years, ——	8	6	6
Clear profit in four years, —— —— —— —— ——	4	3	6

I have not computed the value of the ſtraw. Becauſe it is ſuppoſed, that the expences of reaping, threſhing, and carrying to market, will be nearly equivalent in this neighbourhood. In other places, where the value of ſtraw may be thought greater or leſs than the expences, the calculation may be made accordingly.

New Method.

Three quarters, ſix buſhels, and two pecks of barley on an acre, at 18 s. per quarter, is worth, —— —— —— —— —— —— ——	3	8	7½
Deduct for expences, viz. Two plowings 8 s. Three horſe-hoeings, 3 s. Hand-hoeing 2 s. 6 d. Seed 2 s. 1 d. ½. Rent 15 s. — —	1	10	7½
Remains clear profit in one year, — — — —	1	18	0
Conſequently the clear profit on one acre in four years, is —— —— —— —— ——	7	12	0

It appears from the above eſtimates, that the profit is conſiderably greater in the drill than the old method; yet I have ſuppoſed the fourth crop in the old way to be wheat. Whereas it is much more common hereabouts, where the land is not perfectly adapted to the culture of wheat, for the farmer to ſow oats, or ſome other ſpring crop, after the clover; and thus is the profit reduced: but I proceed to conſider the calculation of others.

A letter in the 3d volume of the *Muſeum Ruſticum*, page 332, ſigned Y, reckons the clear profit of land in tillage near Bury, at about fifteen ſhillings per acre. According to my calculation, as above, the clear annual profit is one pound one ſhilling, in my neighbourhood, in the old way. But a very ingenious treatiſe in the 5th number, in the Foreign Eſſays on Huſbandry, page 322, recommending the culture of ſainfoin, and clover, with intermediate crops of corn, written by M. De L'Harpe, eſtimates the clear profit of one acre at one pound ſeventeen ſhillings. Therefore, as his method ſeems a very good one (though it is certainly the higheſt calculation of any I ever met with), I ſhall compare the clear profit, to be expected in the drill culture, with his calculation.

Mon.

	£.	s.	d.
Mon. De L'Harpe reckons the annual produce of ſixty acres to be worth	170	0	0
From which he deducts for expences ten ſhillings per acre, and rent ten ſhillings per acre	60	0	0
Clear annual profit on ſixty acres	110	0	9
Drill culture, three quarters, ſix buſhels, two pecks of barley, at eighteen ſhillings, on one acre, conſequently ſixty acres are worth	205	17	6
Deduct for rent, forty-five pounds, and for expences, the ſame	90	0	0
Clear annual profit out of ſixty acres	115	17	6

Hence it appears, that ſixty acres in the drill culture is more advantageous than the higheſt calculation of profit, made by modern improvers. But this is not all. For the above is calculated from a horſe-hoed crop of barley; whereas, in many ſoils, I am convinced, it is more profitable to cultivate wheat in that manner. I have had ſeven ſucceſſive crops from the ſame land, without manure: and the ſoil is yet unimpoveriſhed; and ſown at preſent with wheat, the eighth crop.

	£.	s.	d.
I have had ſometimes two quarters of wheat on an acre worth	3	12	0
Whereas I eſtimate the crop of barley at no more than	3	8	7½
But the clear profit from one acre of drilled wheat may be	2	0	0

Thus

Thus have I, with candour, endeavoured to give a clear and comparative view of the old and new huſbandry. During the eight years, that I have practiſed the latter, I have been careful to obſerve the peculiar advantages, and defects of each method: and if, upon the whole, I at laſt declare in favour of Mr. Tull's ſyſtem, it is without prejudice; and merely from conviction.

That the old method, with the aſſiſtance of the more modern improvements by turneps, and clover; and, by the alternate uſe of the leguminous plants, which require hand-hoeing, is very advantageous, I allow. Perhaps the farmer, who purſues this method in its greateſt perfection, judges wiſely in preferring a ſyſtem, he is maſter of, and can confide in, to another, whoſe principles may be juſt, but the practice of which is totally different from his own. But the farmer, who is ignorant of theſe modern improvements, ſurely ought not to heſitate to adopt the drill culture; which, a few years practice would render habitual; and which, he would find to be much more beneficial. For it is certain, that this is leſs expenſive than the old method; and, when once adopted, eaſier in the execution.

SIR, Ganton, near Malton, Yorkſhire, January 24, 1767.

AGREEABLY to my promiſe, I now ſend you the ſequel of my experiments in agricul-

ture. Nor ſhould I have ſo long deferred doing it, had not indiſpenſible buſineſs prevented me, not only by taking up my time, but engaging my attention to objects of a very different nature from the ſubject of this letter.

At the time I ſent you my experiments of the year 1765, I underſtood, that the *Muſeum Ruſticum* was publiſhed under the patronage of the Society for the Encouragement of Arts, Manufactures, and Commerce; and, therefore, deſired my experiments might be inſerted in that work, rather than publiſhed in any of the newſpapers: But ſince I am informed, that the editors of that work (though perhaps moſt of them may be private members of it) do not publiſh any thing by direction of the Society as a body, I no longer adhere to my firſt intention; but acquieſcing intirely in their views, and truly ſenſible of the honour the Society has done me, in ſending me their gold medal, I leave it to them to make whatever uſe of my papers they may think fit: and, if they judge it more for the intereſt of Agriculture, that the author's name ſhould be publiſhed, I ſhall no longer deſire to conceal mine.

My former experiments began in 1763; and ended in 1765: and they were confined to the culture of barley. But I think, it will ſet the advantages of the horſe-hoeing, or Tullian huſbandry, in a clearer light, if I give

give you the produce of the ſame field, cultivated during eight ſucceſſive years, (including the three I before gave you an account of) according to the principles of the new huſbandry, without dung, or any other amelioration, but what the plow alone has obtained. In communicating to you my firſt attempts, I am ſenſible, that my inexperience will appear to be the cauſe of much loſs. Nevertheleſs, my errors may ſerve as leſſons to others: and, in calculating the profit of a certain portion of land, at a medium of eight years, as I include the firſt, and leaſt profitable ones, I ſhall be ſcarcely ſuſpected of any prejudice in favour of the horſe-hoeing ſyſtem.

About nine years ago, I was induced to begin experiments, by an accidental peruſal of Mr. Tull's book of horſe-hoeing huſbandry. The promiſe of ſuch immenſe advantages, accruing from a particular mode of tillage, ſeemingly neither difficult nor expenſive, made by an author of eſtabliſhed reputation, demanded at leaſt a candid trial. If the author's principles were true, why not adopt them? On the contrary, if falſe, it was high time to undeceive ourſelves, and others.

Though my firſt experiments did not anſwer, in that degree, which I had flattered myſelf they would, they, however, encouraged me to proceed: neither were the faults I committed, nor my ill ſucceſs, unedifying: ſince I had the good fortune to correct

the

the former; and gain experience from the latter.

Having now practiſed the drill culture conſtantly during nine years, as well the horſe-hoeing part, as that branch of it which conſiſts merely in ſowing corn, &c. in equally diſtant rows; having applied theſe methods of culture, not only to corn, but to moſt of the leguminous plants; and having extended my experiments very conſiderably; I may venture at laſt to recommend zealouſly a practice, I have always found both entertaining and profitable.

It is true, many writers on this ſubject have given a much more flattering account of drilling than I am able to give. If their accounts be not exaggerated, either they have been more fortunate than I, in cultivating a ſoil more peculiarly adapted to horſe-hoeing; or they have conducted their experiments with ſuperior ſkill. However, I have never been able, from a ſingle crop, in any one year, of any kind of vegetable, to obtain a larger produce from the ſame extent of equally good ground, where the land was laid out in beds, drilled and horſe-hoed, than where the corn was ſown at random. Vegetables of the pulſe kind are the moſt improved by the horſe-hoe: poſſibly as great a crop of peaſe, beans, or turneps, may be obtained by it. But wheat, barley, or oats, have uſually yielded me a third more from random ſowing; that is, if three

three quarters of wheat may be produced from one acre in the common huſbandry, the ſame ground will, *ceteris paribus*, produce no more than two quarters when drilled and horſe-hoed. But the ſuperiority of one method over another is not to be determined by its advantage of a particular crop; but by many ſucceſſive ones; deducting the expences, and conſidering the net profits. This I have done: and the reſult is, that I cannot avoid giving the preference to the drill ſyſtem.

The actual produce of a field of ſeven acres horſe-hoed, without dung, during eight ſucceſſive years.

DRILL HUSBANDRY.

Years	Acres.	Corn ſown.	Corn reaped.	Medium price of corn each year per buſhel.	Value of the crop.
		quar. b. p.	quar. b. p.		l. s. d.
1759	2	Oats 0 1 2	Oats 8 6 0	at 1s. 6d.	5 5 0
	5	Barley 0 4 0	Barley 10 2 0	at 2s.	8 4 0
1760	4	Wheat 0 1 3	Wheat 4 5 0	at 3s. 9d.	6 18 9
	3	Barley 0 2 1	Barley 10 2 2	at 1s. 6d.	8 5 0
1761	4	Wheat 0 2 0	Wheat 5 3 0	at 3s. 9d.	8 1 3
	3	Barley 0 1 2	Barley 12 0 0	at 2s.	9 12 0
1762	4	Turneps 1lb.	Turneps 60 tun		7 0 0
	3	Barley 0 1 2	Barley 7 2 0	at 3s.	8 14 0
	5	N. B. Turneps were ſown in the intervals of the barley worth			3 10 0
1763	7	Barley 0 4 2	Barley 22 0 0	at 3s.	24 4 0
1764	7	Wheat 0 5 2	Wheat 12 4 2	at 6s. 3d.	31 8 1½
1765	7	Wheat 0 6 2	Wheat 10 0 0	at 5s. 6d.	22 0 0
1766	7	Wheat 0 5 3	Wheat 6 5 0	at 7s.	18 11 0
	56	4 4 1	109 6 0		161 11 1½
		Deduct for the value of the ſeed			7 14 4
		Remains net produce of ſeven acres in eight years			153 16 9½

COMMON

COMMON HUSBANDRY.

Years	Acres	Corn ſown.	Corn reaped.	Medium price of corn each year per buſhel.	Value of the crop. l.	s.	d.
		quar. b. p.	quar. b. p.				
1	7	Turneps 10lb.	Turneps 140 tons		14	0	0
2	7	Barley 2 5 0	Barley 28 0 0	at 2s.	22	8	0
3	7	Clover 0 0 1	Clover 11 load	worth	10	10	0
4	7	Oats 3 1 0	Oats 35 0 0	at 1s. 5d.	19	5	0
5	7	Turneps 10lb.	Turneps 140 tons	worth	14	0	0
6	7	Barley 2 5 0	Barley 28 0 0	at 3s.	33	12	0
7	7	Clover 0 0 1	Clover 11 load	worth	10	10	0
8	7	Oats 3 1 0	Oats 35 0 0	at 1s. 8d.	23	6	8
	56	11 4 2	126 0 0		147	11	8
Deduct for the value of the ſeed 9l. 10s. 7d, and 210 load of dung at 2s. per load 21l.					30	10	7
Remains net produce of ſeven acres in eight years					117	1	1
Drill huſbandry, total produce of ſeven acres in eight years					153	16	9½
Common huſbandry, total produce of ſeven acres in eight years					117	1	1
Conſequently the drill is more advantageous by					36	15	8½
				Proof	153	16	9½

N. B. It is preſumed, that the plowing expences are nearly equal in each method: and, therefore, there is nothing charged here on that account on either ſide. The value of the ſeed, and crop, is ſet down to each, according to the medium prices of corn each year. The above ſeven acres of experiment have not been ſelected, as being particularly ſucceſsful. But only as it happened to be the field where they were begun, and continued to this time, I was, thereby, enabled to relate the ſeries of ſeveral years ſucceſs. The ſoil is light, deep, and dry; a hazle

hazle mould excellent for barley, but generally thought not of ſufficient tenacity for wheat; and worth, in this neighbourhood, fifteen ſhillings per acre, tithe free. The beds extend eaſt and weſt: and the field lies gently ſloping to the north.

This field has never been manured, as I obſerved before, ſince my experiments were begun; nor for many years preceding. It may be remarked, that the firſt crops were not the beſt; but, on the contrary, a regular improvement for ſome years kept pace with its cultivation: and the value of the four laſt crops is almoſt double to the former ones. The greateſt fault committed at firſt, was the ſowing too little ſeed. The land ſeems yet in perfect heart: and though the product of laſt year was leſs than in former ones, it was well known, that the wheat crop failed all over England: as is evident by the preſent high price of that grain. For I cannot allow, that the dearneſs of corn is owing to the bounty, as ſome pretend: having ever conſidered that act of parliament, as the Magna Charta of Engliſh agriculture; and tending, on the whole, to make grain more plentiful and cheap.

Beſides the general cauſes of a ſcanty crop in my field of experiments laſt year, there were ſome particular ones, occaſioned by my abſence in the ſpring, and great part of the ſummer: whereby the hand-hoeing, a very material

material operation, was neglected; and the horſe-hoeings not regularly or duly performed. I perceived, on my firſt examining the ridges in June laſt, that the partitions were full of weeds; and the intervals hard and compact. But it was then too late to apply an effectual remedy: though the weeding and horſe-hoeing were even now of manifeſt ſervice. The bad condition of the beds made me determine, not to ſow wheat again for the next crop; but to give the land a thorough plowing in winter: and I prepared it to be ſown in ſpring. The aforementioned field is valued at fifteen ſhillings an acre,

	£.	s.	d.
Conſequently, the rent of ſeven acres, in eight years, is — — — — —	42	0	0
Plowing expences are, at moſt, fifteen ſhillings per acre. I allow —— —	42	0	0
For the rent and tillage of ſeven acres in eight years, Total	84	0	0
The total produce of ſeven acres in eight years being valued at — — —	153	16	9½
If we deduct for rent and expences of tillage	84	0	0
There remains clear profit, from ſeven acres in eight years — — — —	69	16	9½

Which is one pound five ſhillings clear annual profit from one acre. And though this profit be not near ſo conſiderable, as I before computed, from an actual crop of barley, where the land was in fine order, and

every operation of hand, and horſehoeing exactly performed; yet I judge it to be ſuperior to the old method; and ſufficient to demonſtrate the advantages of pulverization.

	£.	s.	d.
The total produce of ſeven acres in eight years, in the old method is	117	1	1
Deduct for rent and expences, the ſame as above	84	0	0
There remains clear profit on ſeven acres in eight years	33	1	1

which is not quite twelve ſhillings clear annual profit from one acre. Though this clear profit be much leſs than I calculated before: yet I apprehend, that there are many farmers hereabouts, who do not clear more. And, if ſome good managers do clear twenty ſhillings an acre, which I hope, and believe to be the caſe, I have ſhewn, in my firſt calculation, that the improved drill culture is almoſt doubly beneficial; and, by my laſt calculation of a farmer's profit, who is not at the top of his profeſſion, compared with the actual produce in a courſe of drilling, where numberleſs faults were committed, during the five years, the comparative advantage is as much on the ſide of drilling, as where I reckoned the produce of each method at a higher rate: and the proportionable excellence ſtill remains annexed to the ſyſtem of Tull.

As

As I have been ever careful to obſerve the difference betwixt crops ſown at random, and thoſe that were horſe-hoed, I have frequently counted the number of grains contained in an ear of corn. Examples of which, I here ſet down.

Horſe-hoed ears of wheat, taken at random, in 1764.		Common ears of wheat, taken at random, from a rich field, in 1764.	
1ſt. Ear contained	57 grains	1ſt. Ear contained	48 grains
2. Ear ——	59	2. Ear ——	54
3. Ear ——	63	3. Ear ——	57
4. Ear ——	58	4. Ear ——	52
5. Ear ——	57	5. Ear ——	50
6. Ear ——	53	6. Ear ——	55
	347		316
In each ear at a medium	57	In each ear at a medium	52½

In Auguſt 1765, twenty-eight ears of horſe-hoed wheat contained 1692 grains: which is about ſixty at a medium to each ear. Twenty-three ears of wheat, choſen at the ſame time out of an excellent broad-caſt-field, contained nine hundred eighty-ſeven grains; which is forty-three at a medium. Two hundred and ſixteen of theſe corns weighed two drams, two ſcruples, nineteen grains. One remarkable ear of horſe-hoed wheat weighed one dram, and twenty-two grains. In the ſame year, ſixty-five corns of horſe-hoed wheat weighed a dram; and in the common method ſeventy-five. Alſo ſeveral ears of horſe-hoed barley contained from thirty

to thirty-eight grains: of the common ſort, from twenty-five to thirty-two.

Auguſt 29, 1766, twenty-three ears of horſe-hoed wheat plucked at random contained one thouſand ſeventy-two grains, or about forty-ſeven at a medium in each. The broad-caſt ſort contained about forty at a medium.

January 9, 1765, a piece of drilled turnep ground containing fifteen ſquare yards, produced thirteen ſtone, four pounds and a half of turneps: which is at the rate of twenty-ſeven ton to an acre; and the ſame of the beſt broad-caſt turneps, contained in a ſpace of ten yards ſquare, weighed one hundred and ſix ſtone; which is at the rate of thirty-two ton to an acre.

Nov. 28, 1766, twenty yards in length, of a turnep ridge, five feet broad, and horſe-hoed, weighed thirty one ſtone. Conſequently, the produce of an acre would be twenty-ſeven ton. At the ſame time, a piece of common turnep ground, twenty yards long, and five feet broad, containing near thirty-ſeven ſquare yards, produced twenty-ſeven ſtone. Conſequently, the produce of an acre is near twenty-ſix ton. But the horſe-hoed turneps were as big again as the others. I have produced theſe inſtances (and many more I might have brought), to ſhew, that pulverization, without manure, will bring corn, and other vegetables, to greater perfection, than dung

without hoeing. That the undunged root is ſweeter, will hardly be conteſted: and that horſe-hoeing is cheaper than manure, I think I have proved.

The horſe-hoeing tillage applied to the roots of plants may be ſo critically timed, as to come at that preciſe period, when they ſtand moſt in need of it. If the beauty or external appearance of plants be of any conſequence, thoſe which are horſe-hoed, greatly excel in this particular. Indeed, where two fields lie contiguous, the one horſe-hoed, the other not, the difference is very ſtriking. The productions of the one being healthy, vigorous, and of the fineſt verdure: whilſt thoſe of the other are pale, and ſickly. A horſe-hoed field has the appearance of a garden; and enjoys a garden culture. The repeated ſtirrings not only improve the ſoil, by keeping it in a looſe ſtate, proper to be penetrated by the roots, and fibres of plants, which are thus eaſily enabled to draw their nouriſhment from it: but they expoſe every particle in its turn to the influence of the atmoſphere; and procure an inexhauſtible ſupply of food for the purpoſes of vegetation.

I am, Sir,

Your moſt Obedient and

Humble Servant,

DIGBY LEGARD.

ADDITION to the EXPERIMENTS and OBSERVATIONS contained in the LETTERS written in 1763, 1765, and 1767.

SIR, Ganton, May 14, 1768.

AS I am unwilling to diſguiſe any circumſtance, that may appear favourable to the common, or to the diſadvantage of the drill huſbandry; I cannot avoid informing you, that the produce of that particular field of experiment, containing ſeven acres; and of which I related the crops of eight ſucceſſive years; was laſt year very defective. I drilled ſix acres with lentils, in the ſpring of the year 1767; and planted one with potatoes. Theſe crops were choſen on account of a property, they are allowed to poſſeſs, of improving and mellowing the ſoil; and preparing it for wheat crops: and in order that the weeds and twitch-graſs, which ſome neglect laſt year had cauſed to abound, might by hand, and horſe-hoeing, be effectually deſtroyed. The ſeaſon proved ſo extremely unfavourable, during the ripening of the lentil crop (which before looked very promiſing), and the rains continued ſo violently after it was reaped, that the ſtalks and pods became quite mouldy; and moſt of the grains ſprouted. In this condition, it was obliged to be houſed: and, therefore, it is no wonder, it was of ſo little value. Indeed though the quantity was tolerable, the quality of the

crop

crop was ſo bad, that I cannot ſet any value on it; but muſt eſteem the expence of ſeed, and cultivation, as ſo much entire loſs. Yet one of the ends propoſed was effectually obtained, viz. the getting the land into fine order, for a ſucceeding crop of wheat: which was drilled laſt autumn; and now looks perfectly well. The acre of potatoes ſucceeded better. A ſingle row was planted on five feet ridges, fifteen inches diſtant in the rows. The produce was fifty-four buſhels, which at ſix-pence per peck (the price at that time), were worth five pounds eight ſhillings: and that being the whole of the product of the ſeven acres, may be thus eſtimated, viz.

	£.	s.	d.	£.	s.	d.
Expence of rent, —— —— ——	5	5	0			
Cultivation, —— —— ——	3	10	0	9	16	0
Seed, —— —— —— —— ——	4	1	0			
Value of the crop, —— —— —— —— —— ——				5	8	0
Total loſs —— ——				4	8	0

Therefore, as I reckoned, in my former letter, the total clear produce of ſeven acres, in eight years, deducting rent, and tillage	69	17	0
I ſhall now include the laſt year's loſs: and then the clear profit of ſeven acres, in nine years, will be only —— —— —— —— ——	65	9	0
Clear profit of ſeven acres in nine years, in the common method —— —— —— —— ——	37	5	0
Difference —— ——	28	4	0

I have added the medium profit of twelve ſhillings per acre, to the ninth year in the

common huſbandry; and have deducted the loſs of four pounds eight ſhillings from the ninth year in the drill huſbandry. Yet it is proved, that the latter gives an advantage of more than twenty-eight pounds over the former, in a leaſe of ſeven acres for nine years: and it is very probable, that when the preſent wheat crop now growing, and in a flouriſhing condition, ſhall be added to the account, the excellence of the horſe-hoeing huſbandry will be more evident. That part of this field where the potatoes grew, makes the beſt appearance at preſent: and therefore, I can particularly recommend this plant, as an excellent preparative for wheat; whenever the cultivator ſhall think it neceſſary to vary his crops, in the drill culture. I have frequently found ſuch variation proper. For even ſuppoſing the land capable of bringing wheat for many ſucceſſive years; yet if it be over-run with weeds; or not brought to that perfect ſtate of pulverization, which is eſſential to this ſyſtem; a crop of pulſe, which does not impoveriſh the ground, being ſown in the ſpring, gives time to break the ſoil by two or three winter-plowings: and by its ſhade, and the frequent hand-hoeings it requires, enables one to obtain almoſt a compleat victory over thoſe arch enemies the weeds.

Of other excluſive benefits, attending the potatoe culture, I can give the following inſtance. October 31ſt, 1765, an

acre

acre of potatoes planted on a rich dry ſoil produced thirty-ſix quarters: which, at three pence per peck, (a very low price) were worth fourteen pounds, eight ſhillings. Another acre, the preceding year, was planted with potatoes on five feet ridges; viz. a ſingle row on every ridge; and each plant a foot diſtant. Theſe were well weeded, and horſe-hoed: and the crop was thirty-ſeven quarters, five buſhels: which, at three ſhillings per peck, comes to fifteen pounds, four ſhillings. But here the land was very rich. Though can there well be a more profitable culture? Turneps are particularly ſuited to the Tullian ſyſtem. But, if introduced, as an intermediate crop, ſhould be ſown early: viz. in the beginning of June, that they may attain their full growth, and be removed or fed off in time, to give the ground a due preparation for wheat. I generally drill a ſingle row of turneps on five feet ridges: and the produce is from fifteen to thirty-two ton, according to the goodneſs of the ſoil, and ſeaſon. I think twenty ton may be reckoned the mean produce on land worth fifteen ſhillings an acre. Some admirers of the Tullian ſcheme recommend all vegetables as proper for horſe-hoeing; and particularly ſainfoin: but I cannot think any of the graſſes, excepting lucerne, can be ſo cultivated to advantage. 'Tis true, I have had very great crops of ſainfoin ſeed this way: and once, in particular,

cular, I meaſured the quantity of a ſingle row, on a three feet ridge; and found, that one hundred yards in length produced five pecks; and, conſequently, that an acre would yield ſeven quarters, four buſhels: an aſtoniſhing quantity! But it muſt be obſerved, that here the rows were perfectly weeded; and the ſeed gathered by hand: ſo that ſcarce a grain was loſt. Whereas in the common way of mowing and threſhing, there is generally immenſe waſte: probably amounting to half the quantity. But, on the other hand, the expence of gathering the ſeed of one acre by women, calculated from the ſmall row abovementioned, would amount to three pounds. Horſe-hoed ſainfoin is certainly moſt vigorous; and produces the fineſt ſeed. But, becauſe moſt vigorous, it does not follow, that it makes the beſt fodder. On the contrary, many farmers are of opinion, that the ſtalks, where thus ſtrong, and pipy, are improper food for cattle: and that the ſainfoin, which is ſown very thick, and is fine, is the beſt. But I own, I have ſeldom found, that horſes leave any, not even the groſſeſt parts of the ſainfoin plant. They will eat the ſtalks, where the ſeed has ripened. Sheep are more delicate. For though they are exceſſive fond of ſainfoin, both in graſs, and hay, you may frequently ſee the thickeſt of the ſtems left untouched, where they have been foddered. Though I do not altogether approve

approve of drilling ſainfoin, to be horſe-hoed, I prefer the drilling of it in equally diſtant rows, to ſowing by hand. Becauſe the drill ſows more regularly than the hand; and you ſave half the quantity of the ſeed. I am ſure, I have not leſs than one hundred acres of drilled ſainfoin. Some of it in rows at one foot; and the reſt at half a foot diſtance. The greateſt quantity, I ever ſow, is three buſhels to an acre. The leaſt (and which I generally ſow) is one buſhel and a half to an acre: and I have many fields, where the plants are quite regular; and ſtand as thick as one would wiſh: producing very good crops.

Now I am upon the ſubject of graſs-ſeeds, I muſt remark to you, that I have, within theſe few years, incloſed an extenſive tract of country, viz. near three hundred acres of the Wolds of Yorkſhire: which is a wild heath; and almoſt barren down. I ſay almoſt barren: becauſe, except near the villages, and in ſome more populous, and better cultivated parts, that immenſe country, called Wolds, is either a ſheep paſture, or appropriated to the culture of miſerable oats or barley. The tillage land, at a diſtance from the villages, has no other manure allowed it than what the ſheep-fold affords. It has generally a crop once in two years: which, at a medium, cannot be ſaid to produce more than three fold. They ſow about four buſhels of oats; and reap about twelve

buſhels. The ſoil is generally dry, ſhallow, and ſtony: and the tithe of the corn is uſually of more value than the rent of the land. I ſpeak of the higheſt, and worſt parts of the Wolds. For in ſome of the vales, the land is rich. But I have ſeveral thouſand acres, that do not let for a ſhilling each acre. This inclоſure, after being reduced into fine tilth by repeated plowings, and manured by the fold of a large flock of ſheep, which I keep for that purpoſe, has been gradually and ſucceſſively laid down with all the various kinds of graſs-ſeeds, in common uſe.

The principal of thoſe are ſainfoin, all the clovers, burnet, trefoil, lucerne, rye-graſs, rib-graſs, and common hay-ſeeds.

Of all theſe, ſainfoin has made the moſt general, and greateſt improvement. This plant, whilſt growing, is grateful to all kinds of cattle: and the hay is excellent. The produce from ſuch land, as I have deſcribed, is, in a good year, about a ton to an acre: taking the whole crop of a large field together. It is true, I have had three ton to an acre in rich land. But one ton from ſuch poor land appears to me a more extraordinary produce: and beſides, the hay is finer, ſweeter, and more nouriſhing from the latter, than from the former.

As to lucerne, I could never get it to ſucceed on ſuch a ſoil. I ſowed a few acres, where

where the land was in perfect tilth, and free from weeds; had been well manured with the ſheepfold, and with pigeons dung; and, after the firſt year, was well harrowed, according to the late Mr. Rocque's directions; but ſtill the plants looked half-ſtarved: and though there was a ſufficient number of them, the crop was ſcarce worth mowing.

The burnet hath ſucceeded very well. I have ſown, within theſe three years, about twenty acres with it; and have had good crops: which ſhews, it will do on a poor ſoil. But then I muſt confeſs, that my ſheep will ſcarce touch it at firſt; and never ſeem to like it ſo well as other graſſes. Some horſes diſlike it: but my cows in general are very fond of it. I once kept a cow above a week in a ſtable; and fed her with nothing but burnet: and we found both her milk and butter excellent.

The common broad clover has ſucceeded pretty well with me. Though, as it laſts but a year or two, it is fitter for an intermediate crop, on tillage land, than to be ſown where the land is to remain in graſs.

The ſame objection lies againſt trefoil, and rye-graſs. There is, indeed, a perennial ſort of red clover; and, alſo, of trefoil; that grow commonly enough in many of our beſt meadows: which would be extremely well worth cultivating. But I have never been able to procure the ſeeds of theſe in any quantity.

quantity. However, I intend to have both ſorts gathered by hand; as likewiſe ſome ſeeds of the wild purple and yellow vetch. All which are excellent plants.

The white clover does very well in our upland paſture; and is particularly proper for ſheep. It is often called honey-ſuckle, from its ſmell reſembling honey; and its being a remarkable ſweet food. I ſuſpect, that the ſeeds of this plant will lye for many years uncorrupted in the earth. For I cannot, otherwiſe, account for the following fact: viz. I have frequently obſerved fields covered with this plant, where paſture has ſucceeded arable land, without any body's remembering the ſowing it*: and often, in an

* This fact of the white clover ſpringing in great quantities on land copiouſly manured, where there was, before, ſuch manuring, no appearance of it is, very curious: but frequent in the northern parts of England; and in Scotland. It is not confined to manuring with dung: but the ſame event follows, where a change of ſoil is made, by lime, or marl, laid on in great quantities. I have an account by me of an uncommon large crop, not leſs than three tons an acre, being produced at Kedgely-moor in Northumberland, in conſequence of a large quantity of lime being laid on ſome acres of black moor land, covered with heath. The heath was intirely killed: and this great burthen of white clover ſucceeded without any aſſignable means of conveyance of the ſeed. I find, from other accounts, that the ſame commonly happens in the county of Galloway; where great quantities of ſuch moor land have been lately brought into cultivation. Very copious manuring with lime, dung, or marl, appears there to deſtroy the heath and produce white clover.

old

old worn-out meadow, or paſture, a crop of this will appear after plentiful dunging. Nor is this property of vegetating, after being ſo many years buried, peculiar to white clover. Muſtard will do the ſame; and the ſeeds of numberleſs weeds: as I have to my coſt experienced. For in my field of experiment, where the horſe-hoeing culture has been continued during nine ſucceſſive years; where I have been particularly deſirous to exterminate the whole race of weeds, by hand-hoeing, and the plow; and where no manure has ever come, and conſequently no acceſſion of weeds; yet even there I can ſcarcely perceive any diminution of the enemies ſtrength. Like the heads of Hydra, one race ſucceeds another.

As I before might ſeem to caſt ſome reflections on lucerne, I muſt now do juſtice to its merit. For I have cultivated it with ſucceſs in a rich, deep, and dry ſoil. I have about two acres on beds of three and four feet breadth, in ſingle, and double rows; part tranſplanted; and part ſown; which I keep carefully weeded: and which yields me generally three, and ſometimes four crops in a ſummer. The firſt crop is now, the 13th of May, ready to cut, being a foot and a half high. I find it of immenſe uſe; and a very great ſaving of corn. I give it to my coach, and ſaddle horſes, regularly every day, freſh as it is cut: and I really think it, in ſome meaſure,

meaſure, ſupplies the place of oats *. I have frequently fed ſome of my horſes with half lucerne, and half their uſual allowance of corn; and found, that thoſe horſes were in higher fleſh, and ſpirits, than the others; which had their uſual food: viz. hay and corn. I think the tranſplanted lucerne is ſomewhat more vigorous than what was ſown on the beds, with the ſingle rows at three feet, or with the double at four feet diſtance. But the difference is not very great. Upon the whole, I prefer tranſplanted ſingle rows, on beds three feet broad; and the plants one foot diſtant in the rows. In this method, they are eaſily hand-hoed: and a plow may work conveniently in the intervals. But either in ſingle, or double rows, with three or four feet interval, tranſplanted, or ſown, it may do extremely well; provided you weed carefully: but that is eſſential. With ſuch care, and expence, often repeated, viz. three times a year, you may have good lucerne

* The remark of lucerne's ſupplying the place of corn, in the feeding of horſes, is verified by a fact related in a letter to Dr. Templeman, from a gentleman of undoubted veracity, inſerted in a collection publiſhed in 1766: where the writer ſays, "In 1763, the plants were arrived at a "ſize to yield ſo full a crop, as to maintain five horſes from "the middle of May to the end of autumn; or about five "months. Theſe horſes, though conſtantly worked very "hard, had neither corn nor hay given them during all "this time: and yet they remained in health, and ſpirits, "and grew fat. A horſe, which in May, was in ſo bad a "ſtate of health, that it was thought he could not live, "ſoon recovered when fed with lucerne."

cerne on almoſt any ſoil; and, without it, the moſt proper ſoil in the world will not ſupport lucerne above a year or two. I have followed Mr. Rocque's inſtructions in ſowing lucerne broad-caſt on a good ſoil; and harrowing: but never could obtain a valuable crop after the firſt year. As to the quality of lucerne, I have the higheſt opinion of it. It is wholſome, nouriſhing, and heartening; particularly good for bringing lean cattle, or horſes quickly into fleſh. All beaſts are remarkably fond of it: and the quantity of it produced is very great; particularly if we may credit what M. Duhamel relates of ſix ton of hay being the annual produce of an acre: but, whatever advantages may accrue from the climate of France, we are not to expect ſuch crops in England, at leaſt not in a general way. But I do not hold it to be impoſſible, even with us. However I imagine ſome other graſſes may produce more than lucerne: particularly the common broad clover: which, on twice mowing, I believe will yield a greater burden than lucerne at four cutttings.

I forgot to mention a circumſtance, in regard to burnet, in its proper place, which is this: It has been much diſputed whether or no there be two diſtinct ſpecies of the burnet graſs; or whether that ſort, which Mr. Rocque brought into faſhion, differs from the common wild burnet, ſo frequent on many heaths and paſtures. As

the latter abounds in my neighbourhood, I had an opportunity of making the experiment, which follows. I ordered my gardener to collect a number of the wild burnet plants, from an upland paſture; and plant them in my garden; and to ſow another contiguous bed with the ſeed I had obtained from Walham Green. He did acordingly: and I have obſerved, that a garden culture makes little or no difference in the nature of the wild plant. It bears the general reſemblance it originally had to the cultivated burnet: but maintains its peculiar difference. The wild ſort is of a much darker green: and the leaves are ſmaller, and leſs indented. The cultivated kind is, upon the whole, a much larger plant. The ſtalks are more red: and its taſte more agreeable to cattle. I have given an handful of the one to my cows; which fed voraciouſly on it: and, on preſenting the other, they rejected it. My horſes in general, eat the burnet graſs very well. Yet ſome do not take kindly to it at firſt; and others will not take to it at all: which obſervation, as it has been frequently made by others, ſhews there is ſomething particular in the nature of this plant, which is not agreeable to every conſtitution. Horſes will eat burnet ſeed: and it might poſſibly prove a ſubſtitute for oats*.

As

* The produce of burnet ſeed is exceedingly great: and if it ſhould be found to agree with beaſts, would certainly afford

As I have in a former lettter, mentioned the price of horſe-hoeing, and of the drilling inſtruments,

afford a very profitable return. Mr. Lambe, who gained the Society's premium for cultivating burnet, mentions, in a letter on this ſubject, that in the dry ſummer 1765, though, by the miſmanagement of keeping cattle on the field of burnet, from the middle of April to the 20th of May, he greatly injured the crop of ſeed; yet obtained two hundred buſhels from ſeven acres and a quarter from one reaping: and he intimates, he might have had another crop, if he had not been indifferent to it, from having already got as much ſeed as he knew how to diſpoſe of. According to this, and other accounts, it might be practicable, from two complete crops in one year, to produce ten quarters from an acre. How far the nutritious quality of burnet ſeed is equal to corn, is not yet well determined. It has been ſaid to be equal to oats; but the lightneſs and chaffy texture of it, give room to ſuſpect otherwiſe. There is however the greateſt reaſon, from the gentleneſs of the flavour and ſmell, to believe it would be a wholeſome food: though, from the ſlight pungency in the taſte, it muſt be concluded of a warm quality.

If it ſhould agree with horſes and cattle, certainly it would be a much more profitable article than oats in the light of provender; allowing it to be leſs nutritive; conſidering that a field of burnet will hold a number of years; is not originally expenſive in the cultivation; and beſides, the ſeed would afford a great additional advantage in hay and paſture, at the time when moſt wanted. Mr. Lambe had ſeven ſacks of chaff, and ſeven loads of hay, along with the two hundred buſhels of ſeed from the ſeven acres and an quarter. And, after this crop, which was in the beginning of July, he turned into the burnet ſeven cows, two calves, and two horſes: which it ſupported till Michaelmas. The cows, notwithſtanding the great drought, gave an uncommon quantity of rich milk. This, together with the feeding ſix head of cattle on it again in November; and eating it the five weeks beforementioned, in the ſpring; ſhews the culture of burnet to be extremely

ſtruments, in my neighbourhood, I ſhall here give the prices of the common inſtruments and of day-labour.

	l.	s.	d.
A common foot-plow compleat coſts about —	0	11	0
A waggon — — — — — — — — — —	20	0	0
A day labourer in winter and in ſpring ——	0	0	10
Ditto in hay-time — — — — — — —	0	1	0
During harveſt — — — — — — — —	0	1	6
A carpenter or wheelwright per day — — —	0	1	4
A maſon per day —— — — — —	0	1	8
Mowing graſs, if a middling crop, coſts per acre	0	1	0
The ſame for barley or oats —— — —	0	1	0
Plowing an acre of light land with two horſes	0	3	6
Of ſuch land they generally plow an acre in a day.			
A load of dung — — — —	0	1	0
Ditching in ſoft earth for a ſolid yard — —	0	0	1
In harder ground ——— — — — — —	0	0	2
Or perhaps, according to its nature — —	0	0	3
The women have a day for hay; —— —	0	0	5
And for harveſt work — —— — —	0	0	8

Two quarters of wheat, and four of barley, are commonly obtained from the beſt fields. The rent of which is twelve ſhillings per acre.

The uſual courſe of crops is turneps, barley, clover, wheat. They plow three or four times

profitable, if the ſeed could be any way made a ſubſtitute for oats.

Mr. Lambe found his horſes eat the ſeed very well, and imagines it will be as good as oats. But it then bore too great a price for other purpoſes, to be appropriated to that of feeding horſes.

times for a turnep crop; and hoe once: which coſts ſix ſhillings an acre.

Twelve or fourteen loads of dung are uſed for the turneps: which, as the land hereabout is light, or ſandy, are generally fed off with ſheep folded thereon.

One plowing is given for the barley, before winter; and another in April, immediately before ſowing.

About two and a half buſhels of ſeed are ſown on an acre.

The clover is generally mowed twice. But, in that caſe, and if wheat be to follow it, our farmers lay a few loads of manure, on the clover ſtubble; and plow it in: after which, the wheat is ſown on one tilth.

It is time now to conclude this long letter. I have endeavoured to give you a fair and candid account of my ſucceſs, improvements, and experiments in agriculture. If, amongſt a variety of trials, ſome have ſucceeded, I may hope my ſucceſs may encourage others to proſecute the ſame: and, where I have failed, my errors may teach them to avoid falling into the ſame.

I can, however, ſay with truth, that, after ten years conſtant, and very extenſive practice; after the experience of a great variety of ſoils, and ſeaſons; I can recommend the drill, and horſe-hoeing culture, as founded on reaſon, and on truth. I have conſtantly at-

tended, with all the impartiality I am maſter of, to the peculiar advantages, inconveniencies, expences, and benefits, both of the old and new huſbandry: and I cannot avoid giving my verdict in favour of the latter.

I am, Sir,

Your moſt obedient

And humble ſervant,

DIGBY LEGARD.

ARTICLE

ARTICLE IV.

REMARKS *on the comparative profits of the* DRILL, *and* BROAD-CAST TILLAGE, *as deduced from the account* * *of experiments, made in* Cumberland, *by the Rev. Mr.* LOWTHER; *communicated to the* SOCIETY FOR THE ENCOURAGEMENT OF ARTS, &c. *in* 1763; *and thoſe made by Sir* DIGBY LEGARD *in* Yorkſhire, *related in the preceding article.*

THE very inſtructive lights afforded by the account of eight years experiments on the drill, and broad-caſt manner of tillage; or, as they are commonly called, the old and new huſbandry; given in the preceding article, cannot fail to be acceptable to thoſe, who are ſollicitous for the advancement of agriculture, into whoſe hands it may fall. The conſideration of the comparative advantages of theſe two methods of culture, furniſhes more important matter of ſpeculation than any other ſubject of this nature, which can poſſibly occur in the purſuit of the im-

* This account was ſent to the Society in claim of the gold medal offered for the beſt ſet of experiments to determine the comparative advantages of the drill and broad-caſt tillage, in the cultivation of wheat; and obtained that premium.

provement of huſbandry. Since it does not confine its views to the cultivation of one ſingle plant only, but extends them to nearly all that are made the ſubject of tillage, except the ſeveral ſpecies of true graſs: and even with reſpect to them, it has a convenience, already known by experience, when they are to be raiſed ſeparately for ſeed.

Nothing, however, can be concluſively determined with reſpect to the abſolute or comparative utility of any mode of tillage, but by obſervations on facts, occurring in trials made at large, and under ſuch a variety of circumſtances, as may prevent the deception into which accidental contingencies, and the peculiarities of ſoil, and ſeaſon, are apt to lead. Every juſt and full report, therefore, of any experiments on drill culture, eſpecially if performed concurrently with broad-caſt, on the ſame land, muſt contribute to the collection of *data* wanted for the deciſion of the momentous queſtions; Which is the moſt profitable, of the drill and broad-caſt methods of tillage?—and, Under what circumſtances, as to ſoil, and mode of culture; and with reſpect to what ſubject plants; does the preference lye?—Speculations on ſound principles will lead us to form rational conjectures, and to follow a right courſe in our experiments; and in that reſpect are eſſentially conducive to improvements of this kind: but they can never enable us to decide with certainty,

tainty, till we have the evidence of actual trials.

There are, however, ſuch accounts of experiments already made, which have been laid before the public, or the Society for the Encouragement of Arts, &c. as give the greateſt room to believe, that, through the increaſe of produce in quantity, or value, or the diminution of expence, the profits of tillage may, in a term of ſeveral years taken together, be rendered a third greater, or perhaps even doubled to the farmer, by the ſubſtitution of the drill culture in the place of the common, or broad-caſt. This preference appears, from theſe experiments, alſo, in ſome degree, to hold good of indifferent, as well as rich ſoils; and of other kinds of cultivated plants, as well as corn, and to have many other advantages. But among the accounts here alluded to, there are none, which ſupply more ample matter towards the determination of theſe points, than that abovementioned. As it contains a very minute detail of the circumſtances, requiſite to be known, both with regard to the culture, and produce, of a conſiderable portion of land for eight ſucceſſive years, delivered in ſuch a diſtinct, methodical, and impartial a manner as is rarely found in communications of this kind. The being authenticated by a very reſpectable name ſtamps, moreover, an additional value. For ſuch accounts of experiments, when given

given on dubious authority, loſe thence a part of their weight with the public. But the particular utility of the experiments in that account, conſiſts in their being principally directed to decide, how far a new mode of tillage may ſuperſede the uſe of manure: which, though there are many others, is the principal advantage propoſed in the drill culture. Whereas moſt of the other experiments have been made on land prepared with manure, and conſequently have no tendency to elucidate this great point.

Whatever may conduce, nevertheleſs, to give a ſtronger ſanction, on a juſt foundation, to thoſe deductions, in favour of the drill-culture, which may be drawn from this account, might claim a place here: but there is one communication which has a particular right to it. In the ſame year, the firſt letter of the preceding article was received by the Society, another inſtructive account, of ſimilar experiments on drilling, but with the uſe of manure, made in Cumberland by Mr. Lowther, was laid before them. This tends to corroborate, and ſupport the concluſions afforded by the other; and to add, alſo, ſeveral collateral lights, that may render it more extenſively uſeful. A brief view of them brought in compariſon with each other, will illuſtrate ſeveral important particulars in both; and render them more effectual to the propoſed end of deciding on the merits of the two methods of culture.

The

The courſe of tillage with relation to the choice and ſucceſſion of crops, as well as the kind of land, and preparation, were, however, different in the Cumberland account from the Yorkſhire; and the compariſon was alſo made with a different ſett of crops in the broad-caſt. In order, therefore, to form juſt practical deductions from this account, it is neceſſary to premiſe ſome particulars of the circumſtances, and manner of tillage in both ways, which were practiſed in theſe experiments. The broad-caſt method was that, commonly followed in the cultivation of wheat in Cumberland, and many other places of England. The firſt year is a crop of turneps raiſed with a full proportion of manure: the ſecond year is a lea, or abſolute fallow: and the third year is a crop of wheat. The ſame rotation is practiſed every three years.

The manner of drill-tillage followed in theſe experiments, was, with reſpect to the courſe of three year crops as follows. The firſt year turneps, with half the quantity of manure of the broad-caſt: the ſecond year, barley: and the third year, wheat. The barley and wheat is repeated the fourth and fifth year: and then the manuring and turneps muſt take place again.

The ridges were formed five feet and a half wide: and there were a treble row of drills, at ſeven inches aſunder on each ridge.

The land, on which the experiments were made,

made, was "a heavy moiſt ſoil, with a clayey "bottom; and deemed too ſtiff for barley." It was tilled out of lea; and had borne a crop of of oats. The rent was eight ſhillings per acre.

Expences and produce of the BROAD-CAST TILLAGE of one acre of land, as practiſed in CUMBERLAND.

The firſt year for turneps.	£.	s.	d.
Three ploughings with two horſes: the firſt in March, ſecond in May, and third in June	0	10	6
60 one horſe cart-loads of manure	1	0	0
90 buſhels (Wincheſter) of lime	0	15	0
Six days work of man and horſe loading the manure, and two ditto the lime	0	14	8
Two days work of the labourer ſpreading the manure	0	1	8
Seed, and ſowing	0	2	0
Three harrowings	0	1	6
Total expence the firſt year	3	5	4
The value of the crop of turneps produced may be computed at	£. 3	0	0

The ſecond year for fallow.

The third year for wheat.

Four ploughings	0	14	0
Four harrowings and ſowing	0	2	6
Seed wheat three buſhels	0	12	0
Total expence the third year	1	8	6
The value of the crop of wheat, being three quarters, at 4s. per buſhel	4	16	0
Total produce in three years	7	16	0

Total

	£.	s.	d.
Brought over, Total produce in three years —	7	16	0
Total expence for three years, including rent at 8 s. per annum per acre — — —	5	17	10
Total profit in three years — — — —	1	18	2
Annual profit on the three years taken together — — — — — — — —	0	12	$8\frac{10}{15}$

Expences and produce of the DRILLING and HORSE-HOEING TILLAGE of one acre of Land, as practiſed by Mr. LOWTHER in CUMBERLAND.

The firſt year for turneps.	£.	s.	d.
Three ploughings with two horſes, viz. the firſt in March, ſecond in May, third in June —	0	10	6
30 one-horſe cart-loads of manure — —	0	10	0
Forty-five buſhels (Wincheſter) of lime —	0	7	6
Three days work of a man and a horſe loading the manure, and one ditto the lime — —	0	7	4
One day's work of a labourer ſpreading ditto	0	0	10
Seed — — — — — — — —	0	0	6
Harrowing and drilling — — —	0	1	6
Three horſe-hoeings, each equal to one third of an acre — — — — —	0	3	6
Total expence the firſt year — — —	2	1	8
The value of the crop of turneps produced may be computed at — — —	2	10	0

The ſecond year for barley.			
Two ploughings, viz. the firſt in March, and the ſecond in April or May. — —	0	7	0
Seed barley, viz. one buſhel (Wincheſter) —	0	2	0
Harowing and drilling — — —	0	1	6
Three horſe-hoeings — — —	0	3	0
Total expence the ſecond year — —	0	13	6
The value of the crop of barley produced may be computed at — — —	1	16	0

The

The third year for wheat.

	£.	s.	d.
One ploughing before Michaelmas — —	0	3	6
Seed wheat — — — —	0	4	0
Harrowing and drilling — — — —	0	1	0
Five horſe-hoeings — — —	0	5	10
Total expence of the third year — — —	0	14	4
The value of the crop of wheat, being fifteen buſhels, at 4s. per buſhel — — — —	3	0	0
The value of the crops of barley and wheat, in the fourth and fifth years, being added, the total produce in the five years will be	12	2	0
The tillage of the barley and wheat, in the fourth and fifth years, and the rent for the whole time at 8 s. per acre being added the total expence will be — — — —	6	17	4
Total profit in the five years — — —	5	4	8
Annual profit on five years taken together —	1	0	$11\frac{8}{15}$
Annual difference of profit in favour of the drill culture — — — — —	0	8	$2\frac{8}{15}$

It appears by this account, that, according to the method of drilling practiſed here, five ſucceſſive crops may be obtained from land which lets for eight ſhillings per acre, in Cumberland, in five years: with half the quantity of manure which is requiſite in the broad-caſt tillage in three years, and conſequently half the expence, alſo of carrying and ſpreading it. But the crop of turneps, compared with the broad-caſt, in which the full quantity of manure was uſed, ſeems deficient in the proportion of two pounds ten ſhillings to three pounds. The crop of wheat, likewiſe, in the other year, ſeems deficient, in the pro-

proportion of one quarter ſeven buſhels, to three quarters: or in other words, of fifteen buſhels to twenty-four buſhels, the produce of the broad-caſt. The ſaving nevertheleſs in the expence of the coſt, and labour of manuring, and of two buſhels of ſeed wheat each year of that crop; together with the profits of the crop of barley in the ſecond and fourth year, inſtead of fallow every third year; exceed the loſs from theſe deficiencies ſo much, as to afford a greater gain to the former of eight ſhillings and two pence halfpenny each year: taking the five together. This is performed; likewiſe with leſs expence and diſburſement on the ſide of the drill tillage, in the proportion of twelve ſhillings each year; taking a term of fifteen years together. The great advantage, in point of profit, of the drill tillage over the broad-caſt is apparent on the face of this account: beſides thoſe other advantages, and conveniencies, which attend this mode of culture. There is no doubt, however, but that on further experiments, Mr. Lowther would have improved his method, ſo as to have rendered the profits greater: and particularly it muſt be obſerved, his crops of barley from the unſuitableneſs of the land are proportionably much inferior to his crops of wheat.

If we make a ſimilar eſtimate of the produce, and expence of land cultivated conſtantly with wheat in the drill way, without

out any manure, according to the particulars in Sir Digby Legard's account, we ſhall ſee, that it ſtill affords conſiderable profits: ſuch as are much greater than can be obtained by the moſt improved broad-caſt.

The greateſt crop of wheat ſtated in this account, to be produced in the eight years, was twelve quarters from the ſeven acres, which was in the year 1764, after [illegible] crop of wheat and barley, and one [illegible] diately preceding. The le[illegible] qua-ters the year after, in 176[illegible] ordinary bad year. The ſoil, [illegible] not well ſuited to wheat, but mo[illegible] barley: as is remarked in the accou[illegible], and as the proportion of the crops themſelves evince. We may, however, reaſonably admit that, on this land, by the beſt of the methods he practiſed in the eight years, there may be obtained conſtant crops of wheat which, *communibus annis*, would yield one quarter, four buſhels, of grain. This is to be underſtood to be without the uſe of any manure. For the ſhewing, that profitable crops may be ſo obtained by drilling, is the great point, to the elucidation of which, theſe experiments tend. The land, as we ſee in the account, "was "light, deep, and dry; a hazel mould, ex-"cellent for barley, but generally thought "not of ſufficient tenacity for wheat; worth, "in that neighbourhood, fifteen ſhillings per "acre."

Expence

Expence and produce of each year for drilling wheat, according to the method practiſed by Sir Digby Legard.

	£.	s.	d.
Two ploughings,	0	8	0
Seed, one buſhel,	0	4	0
Three horſe-hoeings,	0	3	0
One hand-hoeing,	0	2	6
Rent of land,	0	15	0
Total expences,	1	12	6
Value of the crop, being 1 quarter, 4 buſhels, at four ſhillings per buſhel,	2	8	0
Annual profit,	0	15	6

It appears hence, that a yearly profit of fifteen ſhillings and four pence, *communibus annis*, might have been gained by drilling wheat on this land conſtantly every year: without any impoveriſhment of the land: though no manure or fallow were uſed. And as the annual profits of the ſame land would not have been more than twelve ſhillings, if cultivated with a ſucceſſion of different crops in the common way of that country, there is a difference of two ſhillings and ſix-pence in favour of the drill. Further, if we compare it with the actual produce of ſeven acres cultivated in the broad-caſt, for eight years, as ſtated in the particular account of the experiments, in the preceding article, we ſhall

ſee it is, on the whole, ſix ſhillings and two pence per acre, more than was really gained by the broad-caſt.

Theſe facts furniſh very concluſive reaſons for believing, that wheat can be cultivated conſtantly without manure, even on land not well ſuited to it, with greater profit than the common crops in the broad-caſt, with the aid of fallow and manure. But this profit would neceſſarily be found to be much greater on land, that is properly ſuited to that grain.

If we take the ſame view of the actual produce, in theſe experiments, of the barley, cultivated in the drill way, for which this land was proper, the facts ſhew the real profits equal to thoſe, we have deduced here, with reſpect to wheat, by concluſions.

We find the actual crops of barley in drill, produced at leaſt three quarters per acre: which at eighteen ſhillings per quarter amounts to two pounds fourteen ſhillings in value. The expence in ſeed for the barley, is leſs by one ſhilling and four pence half-penny than for the wheat: which reduces the expence of ſeed and tillage to fifteen ſhillings and ſeven pence half-penny, inſtead of the ſeventeen ſhillings and ſix-pence for wheat.

	£.	s.	d.
The produce therefore, being in value, — —	2	14	0
The total expence, including rent —— —	1	10	7½
The profit will be, —— —— —— —— ——	1	3	4½

The

The profit in cultivating barley conſtantly on this ground in drill, without manure or fallow, is therefore greater than that of the common broad-caſt courſe of crops and tillage, with full manure, by eleven ſhillings and four pence half-penny per acre: which leaves no reaſon to doubt, but that, on land equally fit for wheat, as this was for barley, the advantage over the broad-caſt would be the ſame.

As Mr. Lowther's experiments, therefore, ſhew, that, without any fallow, and with half the manure commonly uſed in three years, applied only once in five years, on land of eight ſhillings an acre in Cumberland, he gained, by drilling, eight ſhillings and two pence, annually, more than by the broad-caſt; which affords about twelve ſhillings profit there: ſo Sir Digby Legard's experiments have demonſtrated, that, on land of fifteen ſhillings in Yorkſhire, about twelve ſhillings per acre, more than by the broad-caſt which is there, likewiſe, about twelve ſhillings an acre, may be gained by the drill method.

The facts in theſe accounts, therefore, go far towards demonſtrating, that improved tillage may be ſubſtituted for manure and lea fallow, with an increaſe of profit, and a diminution of the farmer's diſburſements and trouble. Since the ploughing, and other operations of tillage are, according to the beſt

mode of drilling, rather leſs than greater, compared with thoſe of the broad-caſt; and the labour, as well as coſt of the manuring, is ſaved: which, as well as the advance of the expence of the fallow rent, does not afford a full return the ſame year. It muſt not be underſtood, however, that where fallow and manure are omitted, even on very good land, conſtant crops of wheat or barley will be obtained by drill culture, equal to the beſt crops in broad-caſt, with fallow and manure. The facts, in all the different accounts, which have been given, ſhew them to be about half, on the middling land, and two thirds on the beſt. But the ſavings in expences of cultivation, manure, and rent of fallow land, with a conſtant ſucceſſion of crops of wheat or barley, render the profits greater in the proportions we have given, on the whole account of expences and products, when eſtimated for a proper term of years.

The facts, and calculations in Mr. Wynne Baker's report to the Dublin Society, of his experiments on drilling wheat, and barley, carry this much farther. In the broad-caſt, conſiſting of a ſucceſſion of fallow, wheat, and oats, every third year he charges nine barrels of wheat per acre produce from each crop. The fallow year is loſt: and the oat yields in value to the wheat, only as four to nine. In the drill way, he obtains ſix barrels of wheat every year in a conſtant ſucceſ-

ſion. It is proper to obſerve, that this is on the plantation acre, which contains ſeven thouſand eight hundred and forty ſquare yards: and is conſequently larger than ours by three thouſand ſquare yards. The total expence, including rent, *communibus annis*, in fifteen years, is two pounds ten ſhillings, in the broad-caſt; and two pounds, five ſhillings, and one penny, in the drill culture; according to his ſtate of them; which is four ſhillings and eleven pence annually in favour of the latter. But the difference of the value of the produce, which is to be added to this ſaving, is ſo great, that it appears, as he ſays, according to his ſtate, "a farmer, having forty acres "of tillage, ſuppoſing him to direct his attention to bringing it to the drill culture, "would make, in fifteen years, nine hundred ſixty-nine pounds, ten ſhillings, more "than he can in the common huſbandry: "which is ſuch an advantage, that the "greater profit in the drilling acre will purchaſe the fee-ſimple of that in the common huſbandry, at twenty-ſeven years purchaſe, valuing the land at eighteen ſhillings an acre. Thus it appears, that, in "every fifteen years, the fee-ſimple of all "the tillage lands in the kingdom is loſt to "the community, by the common courſe of "tillage."

ARTICLE. VII.

Account * *of Experiments made to determine the comparative Advantages of the* DRILL, *and* BROAD-CAST TILLAGE *of Wheat; communicated by Mr.* COX, *to the Society for the Encouragement of Arts, Manufactures, and Commerce; and inserted at their request.*

To *Robert Dossie*, Esq;

SIR,

THE Society for the Encouragement of Arts, Manufactures, and Commerce, have directed me to deliver to you Mr. Cox's letters; in order to their being published in the Memoirs of Agriculture, if you think proper.

By Order,

PETER TEMPLEMAN.

SIR,

BELOW is the draught of sixteen different experiments made on wheat, in the same field.

* This account was sent to the Society, by Mr. Cox, in claim of the gold medal, offered, for the year 1767, for the best sett of experiments, to determine the comparative advantages of the drill, and broad-cast culture of wheat; which was adjudged to him.

If

If the time limited for delivering in the accounts of the culture of wheat, in claim of the premium, had been after Chriſtmas, I could then have acquainted you with the difference in the meaſure †.

I am, Sir,

Your moſt Obedient

Humble Servant,

Wallhampton, near Lymington, Nov. 12, 1767. MATTHEW COX.

White wheat ſown in broad-caſt, Nov. 5; ſoaked in freſh water twelve hours; in brine twenty-four hours; and limed. Two buſhels of ſeed to an acre. Produce 190 ſheaves.	N°. 1, 1 Acre ¼. Narrow Lands.
White wheat ſown in drills, Nov. 6; ſoaked in freſh water twelve hours; in brine twenty-four hours; and limed. Two pecks of ſeed. Hoed by children the 2d of May, at a half-penny per row; which came to one ſhilling and four pence. This was out of the ground two days before N°. 1. Produce 151 ſheaves.	N°. 2. 1 Acre. Narrow Lands.
White wheat ſown in broad-caſt, Nov. 5; prepared as N°. 1, and 2. One buſhel and an half of ſeed per acre. Produce 140 ſheaves.	N°. 3. 2 Acres. Narrow Lands.

† After this letter was written, part of the wheat was threſhed, before its being ſent: and the amount of the produce will be found below.

N°. 4.

N°. 4. 2 Acres. Narrow Lands. — White wheat ſown with a drill plough, Nov. 6, and 7; prepared as N°. 1, &c. Seven pecks, one quart of ſeed on the two acres. Hoed by children the 4th of May, at a half-penny per row, which coſt me one ſhilling per acre. Produce 396 ſheaves. Moſt of the ears of this wheat and N°. 2, at harveſt, were ſix and ſeven inches long.

N°. 5. ¾ Acre. Narrow Lands. — White wheat ſown in broad-caſt, Nov. 23; brined three hours; and limed. Two buſhels of ſeed. Produce 60 ſheaves.

N°. 6. 3 Acres. Broad Lands. — Red wheat ſown in broad-caſt. Two buſhels and an half of ſeed on an acre. Brined three hours; and limed. Produce 490 ſheaves. Small ears, but very good wheat.

N°. 7. 1½ Acre. Broad Lands. — White wheat ſown in broad-caſt, Nov. 15. Two buſhels and an half of ſeed; which was brined twelve hours; and limed. Produce 380 ſheaves.

N°. 8. 1½ Acre. Broad Lands. — White wheat ſown with the drill plough, Nov. 7. One buſhel and an half of ſeed: which was brined twelve hours; and limed. My ſervant hoed this wheat the 20th of May. Produce 370 ſheaves.

N°. 9. 1½ Acre. Broad Lands. — White wheat ſown in broad caſt, Nov. 7. Two buſhels of ſeed. Limed only. Produce 240 ſheaves.

N°. 10. 1½ Acre. Broad Lands. — White wheat ſown with drill-plough, Nov. 7. One buſhel and an half of ſeed. Limed only. Produce 150 ſheaves.

N°. 11. ¼ Acre. — White wheat ſown in broad-caſt, Nov. 7. Brined twelve hours; but not limed. Two buſhels of ſeed. Produce 150 ſheaves.

N°

N°. 12, 13, Carrots laſt Year, 2 Acres.

White wheat ſown in broad-caſt, Nov. 7. Brined twelve hours; and limed. One peck and an half of ſeed. Produce 70 ſheaves. — ½ Acre.

Red wheat ſown with drill-plough, March 11. One buſhel and an half of ſmutty ſeed. Brined forty-eight hours; and limed. It was ſo very wet, I could not cover the ſeed ſufficiently. This wheat I mowed; and gave to my hogs. — 1 ½ Acre. Broad Lands.

N°. 14, 15, 16. Vetches laſt year, 3 ½ Acres.

Red ſmutty wheat ſown in broad-caſt, Nov. 20. Two buſhels and an half of ſeed. Brined a few minutes; and limed. Produce 324 ſheaves. — 1 ¼ Acre.

Red ſmutty wheat ſown with drill-plough, Nov. 20. Three pecks of ſeed. Brined five hours; and limed. This wheat my ſervant hoed, the 26th of May. Produce 156 ſheaves. — ¾ Acre.

Red ſmutty wheat ſown Nov. 23. Three buſhels of ſeed. Neither brined, nor limed. Produce 261 ſheaves. — 1 ½ Acre.

This crop was good wheat; except being a little ſmutty near the hedge.

N°. 1, 2, 3, and 4, were chalked. — N°. 5, was dunged and chalked: and, on the 20th of January, twelve buſhels of ſoot were ſown on it.—N°. 6, 7, and 8, had, alſo, in January, ſoot ſown on them, in the proportion of eighteen buſhels per acre.—N°. 9, and 10, had no manure. N°. 11, was only chalked.— N°. 12, having had carrots cleared off at Michaelmas, had no manure. — N°. 13, bearing carrots, could not be clear-

ed

ed off, nor the ground got into proper order, till February: the ſeaſon being ſo very wet. —N°. 14, 15, and 16, bore vetches in 1766. —They had no manure. The ears of the wheat produced on this ground were ſmall; but the grains large. Near the hedge they were ſmutty; but not half ſo bad as the ſeed.

The ground, on which theſe experiments were made, is a ſhallow mould, on a gravel. The whole field is nearly alike; excepting that, from N°. 12 to 16, the ſoil is a little lighter, and runs deeper.

The drilled wheat produced in general ſix, ſeven, eight, and ſome twenty-five ſtems, from one grain. —N°. 2, was remarkable for the number of ſtems from each grain: but the quantity of ſeed ſown was too ſmall. I look upon one buſhel of ſeed to be quite ſufficient for one acre †. The quantity commonly ſown, in this county, is from two buſhel, to two and a half, per acre. At the rate, which wheat is now ſold, there is a ſaving in the drill-method of ſowing, of near the rent of the land: viz. twelve ſhillings and ſix-pence per acre.

† This agrees with the other accounts of the drill-culture, that one buſhel of wheat is ſufficient, as ſeed, for one acre of land cultivated in that method. As two buſhels is the quantity moſt proper in broad-caſt, *ceteris paribus*, a ſaving would be thence made, equal to the rent of the land, taken at a medium value, when wheat is at the price here ſtated.

The

The number of ſheaves produced by the drill-culture were not ſo many, in ſome of the experiments, as by the broad-caſt: but they all weighed more; and produced more grain. The ears, alſo, were conſiderably longer: which I attribute to the hoeing; and the length of time the ſeed was ſteeped in brine *.

The field, in which theſe experiments were made, is called Wimble-field, ſituated on Wallhampton-hill, on the eaſt ſide of Lymington river. It contains twenty-three acres within the fence.

The quantity of wheat produced per acre, cannot be aſcertained: none of the red wheat being threſhed; and only about half the quantity of the white, that was obtained in the broad-caſt method of culture. My real opinion, however, is, that the drilled wheat will yield the moſt grain.

Nov. 19.

N. B. Since I wrote the above, I have threſhed a quantity of both the red and the white wheat; and find, that twelve ſheaves of the red wheat, cultivated in broad-caſt, yield one buſhel of grain: whereas from ten ſheaves of the white wheat, cultivated in

* The ears of corn, from the ſeveral diviſions of the land, according to the numbers by which they are diſtinguiſhed, that were ſent to the Society, as ſpecimens, along with the account of the experiments, appeared, on the examination made by the committee, to which they were referred, to verify what is here ſaid of them.

drills and broad-caſt, the ſame quantity may be obtained. I have threſhed five hundred ſheaves of the produce of each of the methods of culture. The ſheaves were as equal in ſize as poſſible; and weighed about twenty pounds each. The ears I have ſent to the Society were not picked; but the general ſize of each experiment.

SIR, Wallhampton, May 2, 1768.

IN anſwer to yours *, the lands of the experiments N° 1, 2, 3, 4, were chalked, about fifteen load per acre.—N° 5 was manured with dung and chalk; about fifteen load per acre. N°. 7 was only dreſſed with ſoot, ſown by hand in the ſpring.—N° 12 was chalked as the above. The lands to N°. 12 had all three ploughings; and were dragged.

The ſeed-wheat was harrowed in; except the lands ſown with the drill-plough: which were harrowed before they were ſown. We ſowed about three acres per day with the drill-plough: which finiſhed.—The other lands were before carrots and vitches; and had only one ploughing after the crops were off.

I put no more lime than would juſt cover the wheat ſifted through our aſh-ſieve, after it was taken out of the ſteeps. I think,

* This letter was written in anſwer to one, ſent to Mr. Cox, by order of the Committee, deſiring further information of the manner of tilling, and manuring the land for the experiments; and a particular account of the meaſure of the crop produced.

three

three buſhels of lime were all that were uſed for the ſeed of this field. The firſt ploughing, we charge ſix ſhillings per acre: the ſecond, five: the third, four ſhillings.

I have ſown ſome wheat with the drill-plough laſt Michaelmas; have now ſixteen ſtems from many of the ſingle grains; and think it has not done tillering.

The wheat, that was brined this year twenty-four hours, did not riſe till the twenty-firſt day after ſowing; and many farmers ſaid, it would never come up. But that wheat now promiſes to be the beſt crop.

If I can give any further information, I ſhall do it with pleaſure.

I have ſown four acres of peaſe in drills: which, at the beginning of April, promiſed to produce a fine crop. But they are now almoſt all deſtroyed by an inſect, never known before in this country. It is like a pope in the malt: but of a brown colour: I have caught ſeveral; but cannot find any thing that will kill them.

I am, Sir, your very humble ſervant,

MATTHEW COX.

SIR, Wallhampton, May 14, 1768.

I received your favour † this morning; and one from Mr. Box, of the 30th ult. to

* This was in anſwer to a ſecond letter, written by order of the Committee, requeſting ſome further information as to the preparation of the land, the expence, and the produce of the grain.

the

the ſame purpoſe: which, I thought, I had fully anſwered. The land for the drilled wheat was prepared exactly the ſame as land ſown in the common way: only the land for the drilled wheat was harrowed before the drill-plough went on. My drill-plough ſows four rows, and harrows it. It was hand-hoed by children, as to the greateſt part; which coſt me one ſhilling and four-pence per acre. The reſt, my ſervant hoed. I had, on an average, twenty-three Winchester buſhels per acre drilled. The expence of preparing the land is given below. In the account I ſent with the wheat, you will find how each experiment was manured.

I am, Sir,

Your moſt obedient

Humble ſervant,

MATTHEW COX.

One acre of land ſown in the common way.

	£.	s.	d.
Firſt ploughing	0	7	0
Second ditto	0	6	0
Third ditto	0	5	0
Harrowing	0	1	0
Drag, &c.	0	1	0
	1	0	0
Two buſhels of ſeed	0	15	0
	1	15	0

One

One acre of land drilled.

	£	s.	d.
Three ploughings and harrowing — — —	1	0	0
Sowing with the drill, one man and boy, at 1s. 4d. per day — — — — —	0	0	4
Hoeing — — — — — — — —	0	1	4
Lime — — — — — — — —	0	0	0
	1	1	8
One buſhel of ſeed — — — — — — —	0	7	6
	1	9	2

N. B. I had as much or more wheat from one buſhel of ſeeed ſown in the drill way, as from two buſhels ſown in the common way. One buſhel of lime, which coſts ſeven-pence, is ſufficient for twenty buſhels of ſeed. As for the chalk, &c. I charge nothing to either, ſince the expence was the ſame †.

† It appears from this account, that two parcels of land proper for wheat, will produce, when prepared in the ſame manner with full manure, at leaſt as much grain by the drill culture as by the broad-caſt; and that at leaſt a buſhel per acre may be ſaved in the ſeed, in the drill way, compared with the quantity required in the broad-caſt. The expence in the drill-way, as practiſed here, including ſeed, was £. 1 9s. 2d: in the broad-caſt way, £. 1. 15s. 0d. A gain, therefore, ariſes, from ſubſtituting the drill method, inſtead of the broad-caſt, of 5s. 10d. per acre, when corn is at the rate of 7s. 6d. per buſhel; and proportionably at every other price, ſuppoſing both practiſed, with the ſmall proportion of manure.

ARTICLE

ARTICLE VII.

PROCESSES *for dying Leather* RED *and* YELLOW, *as practiſed in* Turky. *Communicated* * *to the* Society for the Encouragement of Arts, Manufactures, and Commerce, *by Mr.* PHILIPPO; *and inſerted here at their Requeſt.*

To *Robert Doſſie*, Eſq

SIR,

THE Society for the Encouragement of Arts, Manufactures, and Commerce, have directed me to deliver to you Mr. Philippo's proceſſes for dying leather red and yellow, in order to their being publiſhed in the Memoirs of Agriculture, if you think proper.

By Order,

PETER TEMPLEMAN.

Proceſſes for dying Leather red and yellow, as practiſed in Turky; with directions for the preparation, and tanning the ſkins: communicated by Mr. Philippo.

ARTICLE I.

Firſt preparation of the ſkins, both for the red and yellow dyes, by dreſſing them in lime.

Let the ſkins, dryed with the hair on, be firſt laid to ſoak in clean water, for three

* The particular circumſtances, reſpecting this communication, are related in the preceding Hiſtory of the Society's tranſactions: page 230.

days.

days. Let them be broken over the fleſh ſide, put into freſh water, for two days longer, and afterwards hung up to drain, half an hour. Let them now be broken again on the fleſh ſide, limed with cold lime on the fame ſide, and doubled together with the grain ſide outward. In this ſtate, they muſt be hung up within doors, over a frame, for five or ſix days, till the hair be looſe; which muſt then be taken off; and the ſkins returned into the lime-pit for about three weeks. Take them then out, and let them be well worked, fleſh and grain, every ſixth or ſeventh day during that time: after which let them be waſhed ten times in clean water: changing the water at each waſhing. They are next to be prepared in drench, as below-mentioned.

ARTICLE II.

Second preparation of the ſkins, for both the red and yellow dyes, by drenching.

After ſqueezing the water out of the ſkins, put them into a mixture of bran and water, new milk warm; in the following proportions: viz. about three pounds of bran for five ſkins; and water ſufficient to make the mixture moderately fluid: which will be about a gallon to each pound of bran. In this drench, ſuffer the ſkins to lie three days: at the end of which time they muſt be well

worked; and afterwards returned into the drench for two days longer. They muſt then be taken out, and rubbed between the hands; the water ſqueezed from them; and the bran ſcraped off clean from both ſides of the ſkins. After this they muſt be again waſhed ten times in clean water; and the water ſqueezed out of them.

Thus far the preparatory proceſs of all the ſkins, as well thoſe to be dyed red, as yellow is the ſame: but, afterwards, thoſe, that are to be red, muſt be treated as follows.

ARTICLE III.

Preparations, in honey and bran, of the ſkins that are to be dyed red.

Mix one pound of honey with three pints of luke-warm water; and ſtir them together till the honey be diſſolved. Then add two double handfuls of bran: and, taking four ſkins, (for which this quantity will be ſufficient) work them well in it one after another. Afterwards fold up each ſeparately into a round form, with the fleſh ſide outward; and lay them in an earthen pan, or other proper veſſel, if in ſummer, by the ſide of each other; and if in winter, on the top of each other. Place the veſſel in a ſloping poſition, ſothat ſuch fluid as will ſpontaneouſly drain out of the ſkins, may run from them. An acid fermentation will then ariſe in the liquor: and

and the ſkins will ſwell conſiderably. In this ſtate, they muſt continue about ſeven or eight days: but the moiſture, that drains from them, muſt be poured off once or twice a day, as neceſſity may require. After this, a further preparation in ſalt is neceſſary: which is to be performed in the following manner.

ARTICLE IV.

Preparation in ſalt, of the ſkins to be dyed red.

After the ſkins have been fermented in the honey and bran, as above-mentioned, let them be taken out of that mixture, on the eighth or ninth day; and well rubbed with dry common ſea-ſalt, in the proportion of about half a pound to each ſkin: which muſt be well rubbed, and worked into them. This will make them contract again; and part with a further conſiderable quantity of moiſture: which muſt be ſqueezed out, by drawing each ſkin ſeparately through the hands. They muſt next be ſcraped clean, on both ſides, from the bran, and ſuperfluous ſalt and moiſture, that may adhere to them: after which, freſh dry ſalt muſt be ſtrewed over the grain ſide; and well rubbed in with the hands. They are then to be doubled, with the fleſh ſide outward, lengthwiſe, from tail to tail: and more dry ſalt muſt be thinly ſtrewed over the fleſh-ſide; and rubbed in. For which two laſt operations, about a pound

and a half of ſalt will be ſufficient for each ſkin. They muſt then be put thus, folded on each other, between two clean boards, placed ſloping breadth-wiſe; and a heavy weight laid on the upper board, in order gradually to preſs out what moiſture they will thus part with. They muſt be then continued, in this ſtate of preſſure, two days, or longer, till it be convenient to dye them: for which they will then be duly prepared.

ARTICLE V.

Preparation of the red dye, in the proper proportion for four ſkins; and manner of application of it in dying the ſkins.

Put eight gallons of water in a copper, with ſeven ounces of ſhenan * tied up in a linnen

* The SHENAN is a drug commonly uſed in dying, in the Eaſt; and very eaſily to be obtained at any of the ports of Aſia, and Africa, in the Levant. It is the *Eaſtern jointed Kali*, called by botaniſts, *Selicornia*: which grows in great plenty on the ſea-coaſt, in thoſe and other parts of the Eaſt. There is a leſs ſpecies of the ſelicornia on our coaſts, particularly in Lincolnſhire; which, from its very great affinity to the ſhenan, might be preſumed to have the ſame qualities. On ſome trials, it has not, however, appeared to anſwer

linnen bag. Light a fire under the copper: and, when the water has boiled about a quarter of an hour, take out the bag of ſhenan; and put, into the boiling fluid or lixivium, 1ſt, Two drams of alum.—2dly, Two drams of pomegranate bark.—3dly, Three quarters of an ounce of turmeric.—4thly, Three ounces of cochineal.—5thly, Two ounces of loaf ſugar. Then let the whole mixture boil about ſix minutes afterwards, over the fire.

Meaſure out two pints of this liquor; and put it into a flat earthen pan. When it is cool as new milk, take one ſkin folded lengthwiſe, the grain ſide outwards; and dip it in the liquor: rubbing the ſame gently in with the hands. Then, taking out the ſkin, hang it up to drain; and throw away the ſuperfluous dye.

Afterwards proceed in like manner with the remaining three ſkins: repeating the ſame operation, on each ſkin ſeparately, eight times, before each freſh dipping; and ſqueezing the ſkins by drawing them through the

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ſwer the end of the ſhenan. But it is proper to purſue the examination of this further; as ſome unknown circumſtances in the collecting, or uſing the Engliſh ſeliconia, might occaſion the miſcarriage. The Eaſtern ſhenan may, at all events, be eaſily procured in any quantity, at a very low price, by any captains of Turky ſhips, or other perſons, who may be at Aleppo, Smyrna, &c.

hand. Lay them now on one ſide of a large pan, ſet ſloping to drain off as much of the moiſture as will run from them without preſſure, for about two hours, or till they be cold. Then tan them as here directed.

ARTICLE VI.

Tanning the red ſkins.

Powder four pounds of the beſt white galls in a marble mortar; and ſift them till the powder be fine. Mix them with about three quarts of water; and work the ſkins well in this mixture for half an hour, or more: folding up the ſkins fourfold. Let them lye in this tan twenty-four hours; when they are to be worked again as before; then taken out, ſcraped clean on both ſides from the firſt galls; and put into the like quantity of freſh galls and water. In this freſh mixture, they muſt be again well worked for three quarters of an hour; then folded up as before, and left in the freſh tan for three days. On the fourth day they muſt be taken out, waſhed clean from the galls, in ſeven or eight freſh quantities of water, and then hung up to dry.

ARTICLE VII.

Manner of dreſſing the red ſkins after they are tanned.

When the ſkins have been treated as above, and are very near dry, they ſhould be ſcraped with

with the proper inſtrument, or ſcraper, on the fleſh ſide, to reduce them to a proper degree of thickneſs. Then they are to be laid on a ſmooth board; and glazed, by rubbing them with a ſmooth glaſs. After which, they muſt be oiled, by rubbing them with olive oil, by means of a linnen rag, in the proportion of one ounce and an half of oil to four ſkins: and then they are to be grained on a graining board lengthwiſe, breadthwiſe, and croſswiſe from corner to corner.

ARTICLE VIII.

Preparation, with galls, of the ſkins for the yellow dye.

After the four ſkins are taken out of the drench of bran, and clean waſhed, as before directed, Article II, they muſt be very well worked, half an hour or more, in a mixture of one pound and a half of the beſt white galls, finely powdered, with two quarts of clean water. The ſkins are then to be ſeparately doubled lengthwiſe, rolled up with the fleſh ſide outwards, laid in the mixtute, and cloſe preſſed down on each other: in which ſtate they muſt continue two whole days. On the third day, let them be again well worked in the tan; and afterwards ſcraped clean from the galls, with an ivory or braſs inſtrument (but no iron muſt touch them): they muſt then be put into a freſh tan, made of two pounds of

galls, with about three quarts of water; and well worked in it fifteen times. After this, they muſt be doubled, rolled up as before, and laid in the ſecond tan for two days. On the third day, a quarter of a pound of white ſea-ſalt muſt be worked into each ſkin: and the ſkins doubled rolled up as before; and returned into the tan till the day following: when they are to be taken out, and well waſhed ſix times in cold water, and four times in lukewarm. The water muſt be then well ſqueezed out, by laying the ſkins under preſſure for about half an hour, between two boards, with a weight of about two or three hundred pounds upon the uppermoſt board: when they will be ready for the dye.

ARTICLE IX.

Preparation of the yellow dye in the proper proportion for four ſkins; and manner of application of it in dying the ſkins.

Mix ſix ounces of caſſiari gehira, or dgehira †, or the berries of the eaſtern *rhamnus*, with

† The CASSIARI GEHIRA is the berries of an Eaſtern rhamnus or buckthorn-tree, and may be obtained at Alleppo, or other parts of the Levant, at a ſmall price, by the ſame means as the ſhenan. The common Avignon

with the ſame quantity of alum; and pound them together, till they be fine; in a marble or braſs mortar, with a braſs peſtle. Then, dividing the materials thus powdered, into three equal parts, of four ounces each, put one of thoſe three parts into about a pint and a half of hot water, in a china or earthen veſſel; and ſtir the mixture together.

Let the boiled fluid ſtand to cool, till it will not ſcald the hand. Then ſpread one of the ſkins flat on a table in a warm room, with the grain ſide uppermoſt; and pour a fourth part of the tinging liquor, prepared as here directed, over the grain ſide, and ſpreading it equally over the ſkin with the flat of the hands, rub it well in. Afterwards do the like with the other three ſkins: for which the mixture firſt made will be ſufficient.

This operation muſt then be repeated twice more, ſeparately on each ſkin, with the remaining eight ounces of the powder of the berries and alum, with the above-mentioned due proportions of hot water, put to them as before directed.

The

Avignon berries, or yellow berries, may be ſubſtituted; but not with ſo good an effect, as the Italian gehira: which is a ſtronger and brighter yellow dye, as well for this uſe, as colouring paper hangings, and other purpoſes.

The ſkins when dyed, are to be hung upon a wooden frame, without being folded, with the grain ſide outwards, about three quarters of an hour to drain: when they muſt be carried to a river, or ſtream of running water; and well waſhed in it ſix times or more. After this, they muſt be put under preſſure for about an hour, till the water be well ſqueezed out; and then hung up to dry in a warm room.

This being performed, the ſkins are to be dreſſed and grained, as before directed for thoſe dyed red: except that they muſt not be oiled.

ARTICLE

ARTICLE VIII.

Account of the Culture, and Uſe in feeding Cattle, of the TURNEP-CABBAGE *. *Communicated by* ROBERT COLVILLE, *Eſq. to the* Society for the Encouragement of Arts, Manufactures, and Commerce: *and inſerted here at their Requeſt.*

To *Robert Doſſie,* Eſq.

SIR,

THE Society for the Encouragement of Arts, Manufactures, and Commerce have directed me to deliver to you Mr. Colville's letters, in order to their being publiſhed in the Memoirs of Agriculture, if you think proper.

By Order,

PETER TEMPLEMAN.

* The confuſion of the name of this plant with that of the ſo-called cabbage, or cabbage-turnep, which is the ſubject of the next article, and a different plant, may occaſion miſtakes of the one for the other, if attention be not given to diſtinguiſh them. This is the kind called here [illegible]: which has an orbicular, or roundiſh bunch on the main ſtalk, ſome inches above the ground, and has long been known in this country as a garden plant, rather for curioſity than for uſe. The other, called *cabbage*, has not any ſuch bunch on the ſtalk above the ground; but the root is orbicular and large, reſembling the turnep. This latter kind was a ſtranger, as far as appears, till laſt year, that it was cultivated, as related in the next article, by Mr. Reynolds.

GENTLE-

GENTLEMEN,

THE principal motive to induce countrymen to come into any new trials, or diſcoveries, is to deviate, as little as may be, from the uſual practice in huſbandry. Therefore I have ſtuck to the old method, in which I have always ſucceeded very well.

At Lady-day, 1766, I took twelve acres of plowed land into my own occupation, being in two pieces, in order to lay them down to graſs, ſo ſoon as I have improved them to my wiſh. Four acres, two roods, one of the two pieces, is a mixed ſoil of clay and ſill; but, from bad management, very foul. After ordering it as well as the time I had would allow, I ſowed it with turnep-cabbage ſeed, in the broad-caſt way: which produced a very good crop; weighing, great part of them, from three to ſix pounds each turnep. Seven acres, and two roods, the other piece of the twelve acres, being marſh land, of a light ſilly, hungry ſoil, I ſowed, alſo, with turnep cabbage ſeed in the ſame manner as beforementioned; and it produced me as good a crop as I expected, from ſo mean a ſoil. The turneps weighed from two to four pounds each.

While I was managing theſe two pieces of land, I ſet my labourers to dig over two acres of a fat rich ſoil, that I had planted with timber plants five years before; and ſowed them with

with turnep-cabbage ſeed, in the ſame manner as before-mentioned; raking in the ſeed. This was but an indifferent crop, owing to its having been ſown with the ſame ſort of ſeed five ſucceſſive years before, when full a third part became degenerated to a long, thick ſtalk, ſomewhat like to brocoli: which was very eatable, by cutting to pieces about an inch thick; as I do the turnep part when I give them to my cattle on paſture land.

I had ſeveral failing patches in the three pieces; and thoſe I filled up by tranſplanting from the places where the plants were too thick. From the ſtricteſt obſervation I could make, before I ſtocked the land, I did not find ſo great a difference between the plantling and the ſeedling as to make it worth any perſon's while to be at the expence of planting his land with turnep-cabbage, inſtead of ſowing it. Indeed, I have made the ſame obſervation for theſe ſeven years laſt paſt, that I have been maſter of this plant, and never found it otherwiſe.

Of the ſeven acres and two roods of cabbage-turneps, I parted off an acre of them with trammel netting, in depth, two feet eight inches: that coſt me three pence per [illegible] much the cheapeſt fence for [illegible] and put forty-eight ſheep into [illegible] December; being three weeks before the great fall of ſnow. When it came, it

it drifted againſt my netting, ſo that it was level; and my ſheep run over it into the other part, where they continued all the time of the ſnow, without any trouble to provide any other food for them; and did extremely well. When the ſnow (which lay on the ground full three weeks) was melted, I could not find, notwithſtanding the turnep-cabbages were more than half eat, any quantity damaged worth notice: which is a ſufficient recommendation for the propagating this plant.

I put twenty-nine ſtore ſheep into the acre after the ſnow was gone, which kept them well a fortnight: ſo that reckoning four pence per ſheep, per week, for forty-eight ſheep three weeks; and three pence per ſheep per week for twenty-nine ſheep; two weeks come to three pounds two ſhillings and ſixpence per acre, which I let for no more to my tenant I took it from, than ten ſhillings per acre.

Of my plantation two acres, I gave part of the crop of turnep-cabbages to my feeding ſheep at graſs during the ſnow: and the remainder, I am now cutting up; and giving to my feeding beaſts: which thrive extremely well on them.

I weighed (after cutting off the ſtalk cloſe to the turnep part) four hundred and fifteen pounds, which were eat by five beaſts of

ſixty

ſixty ſtone each, at fourteen pounds to the ſtone, at three meals.

As to the four acres, and two roods of turneps, I ſhall cut part of them up, for my feeding beaſts: which I hope I ſhall be able to ſend to Smithfield ſome time in April. The other part, I ſhall ſtock with my feeding ſheep: which I ſhall clip about old Lady-day; and ſend them away.

Perhaps it may be thought ſtrange, I ſhould aſſert, there is little difference between the plantlings, and the ſeedlings of this herb, after having ſent you one of each ſort: of which the ſeedling weighed two pounds, and a half leſs than the plantling. But the planting was tranſplanted into a rich garden-ground, while the other continued in the mother-earth till I ſent it to you: which is greatly the inferior ſoil.

There is this great advantage in the turnep-cabbages: as they ſtand about three inches above ground, they are to be cut up in the ſevereſt weather; and given to cattle, when the common turnep is locked up by the froſt. And there is ſtill a further advantage in the turnep-cabbages, that they require no waſhing: which ſaves a great deal of labour and expence.

I finiſhed ſowing, &c. the 23d of April, 1766. I gave them two hoeings, which is uſual with a crop of common turneps. If

any

any further information is required, be pleaſed to ſignify the ſame: as alſo the receipt of this to,

Gentlemen,

Your moſt obedient

Newton, near Wiſbeach, in the Iſle of Ely, Cambridgeſhire, March 4, 1767.

Humble Servant

ROBERT COLVILLE †.

GENTLEMEN,

IN my letter to you laſt ſpring, I gave you an account of my ſowing fourteen acres of land, in three pieces, with turnep-cabbage ſeed; and, at the ſame time, acquainted you with the nature of the ſoil of each piece, the management, and benefit accruing therefrom.

I ſowed in April laſt, twelve acres of the ſame land, in two pieces: viz. ſeven acres and two roods, and four acres and two roods, with turnep-cabbage ſeed: which anſwered as well in all reſpects, as thoſe the year before, excepting about one hundred *, in the four

† This account of the turnep cabbage was ſent by Mr. Colville (now Sir Robert Colville), in claim of the premium for cultivating the turnep cabbage: which was adjudged to him.

* This is a proof of the hardineſs of the turnep-cabbage, the froſt of laſt winter being very ſevere. But though Mr. Colville's plants eſcaped from his ſoil being favourable

four acres and a half, was damaged by the froſt, and not more: which is of ſo little conſequence, that it is not worth mentioning. It would be needleſs to recapitulate over again the account, I ſent you laſt year: as I have nothing new to mention. I am now ſowing the ſeven acres and two roods with barley; and, after it is harrowed in, ſhall lay it down to graſs: ſowing two ſacks of hay ſeeds, and ten pounds of white Dutch clover ſeeds per acre.

In the year 1763, I laid down to graſs, five acres of marſh land (the ſoil a hungry ſill), in the ſame manner, which was let at eleven ſhillings per acre, when I took it into my own hands. It has kept me forty ſheep, and five beaſts for three months in the ſummer, and fifteen ſheep ſeven months in

ble to them, moſt others of the ſame kind were deſtroyed by the rigour of the cold. In the nurſery gardens, they were moſtly killed; and I am informed of ſeveral fields where the ſame happened. Thoſe, which were raiſed by Mr. Reynolds, among his turnep-rooted-cabbage, were likewiſe all killed, as we ſhall ſee in the next article. This ſhews that the turnep-cabbage, though hardy, is not ſo in the firſt degree; as it was thus deſtroyed in ſome lands laſt winter by the froſt: while the turnep-rooted-cabbage, the two kinds of borecole, and the cole-ſeed, remained uninjured every where. The experiments made in conſequence of the Society's premiums for the turnep-cabbage, have, therefore, afforded this light with reſpect to it, that though a hardy plant, compared with moſt others, it cannot be depended on in very ſevere froſts, if raiſed on rich, or moiſt ſoils.

the winter, every year it has been laid down; ſparing it two months, the latter end of the year for a winter paſture. You will obſerve, by the following moderate calculation, the advantage, I have reaped from its laying down to graſs.

	£.	s.	d.
40 Sheep, at two pence per week each, for three months	4	0	0
15 Sheep, at two pence per week each, for ſeven months	3	10	0
5 Beaſts, at one ſhilling per week each, for three months	3	0	0
	10	10	0

I am, Gentlemen,

Your moſt obedient

And humble ſervant,

ROBERT COLVILLE.

AR-

ARTICLE IX.

An Account of the Cultivation of the TURNEP-ROOTED CABBAGE, *now firſt introduced into* England, *as an Article of Agriculture; and of its Application to, and Utility in feeding neat Cattle, Horſes, and Sheep; together with a Method of deſtroying the Fly in Turneps. Communicated to the* Society for the Encouragement of Arts, *&c. in three Letters, by Mr.* John Reynolds; *and inſerted here at their Requeſt.*

To *Robert Doſſie*, Eſq.

SIR,

THE Society for the Encouragement of Arts, Manufactures, and Commerce, have directed me to deliver to you Mr. Reynolds's letters, in order to their being publiſhed in the Memoirs of Agriculture, if you think proper.

By Order,

PETER TEMPLEMAN.

WORTHY SIR, Adiſhham, March 25th, 1768.
By Wingham Bag, Kent.

AS I apprehend, we have obtained a new * ſpecies of turnep-cabbage: which I look upon to be a very valuable acquiſition truly.—A ſpecimen of the plants may be ſeen at Mr. James Gordon's, ſeedſman, in Fenchurch-Street, next Tueſday: having engaged to ſend him a few upon Monday, by a Canterbury hoy, where Dr. Templeman, or any other gentleman belonging to the honourable Society of Arts, &c. may inſpect them; and be, alſo, informed by him (Gordon) of their good qualities for feeding of ſtock, ſo far as I have made trial hitherto. It has been but about two months ſince, we began feeding them off. They produce a marvellous deal of food: and that too, when moſt wanted now; turneps being gone, and no other herbage to be had. This root is proof againſt froſt, when moſt other vegetables are deſtroyed. This I ſay from experience, on fair trial, this laſt winter. One ſingle perch, or ſixteen foot and a half ſquare, taken up from a field of four acres (indi-

* This ſpecies of cabbage with a turnep root is undoubtedly new here, conſidered as a ſubject of agriculture; and as far as appears, has, not before been brought into England. But it was well known to botaniſts: as will be ſhewn in the next article, from the deſcription of authors; and is generally cultivated in the northern parts of Europe.

ferently

ferently choſen), weighed two hundred and five pounds. In another piece, of about an acre and a half, the ſame quantity of ground produced two hundred and ſeventy-three pounds, taken up the 15th of February. Behold! what a noble production this is! Too much cannot well be ſaid of its excellencies, ſo far as I am able to judge.

I rejoice to think of the great good, that may ariſe from this plant to the Public; and the more ſo, as being the happy inſtrument myſelf of its introduction. For I never heard or read of this ſpecies of vegetable; and, therefore, I call it new. Whether or no I am miſtaken, let the connoiſſeurs judge.—This I know, that one acre well cultivated will produce a much greater quantity of more ſubſtantial food, than the beſt turneps I ever ſaw.—I look moreover upon theſe as more certain to the farmer, eſpecially in hard winters, when turneps are often deſtroyed. Thus much, by way of information, I thought neceſſary.—I have no intereſt herein, but to ſerve the community: which I think is every man's duty: and, as ſuch, what I have ſaid is at your ſervice. I am,

Worthy Sir, with all due reſpect,

Your moſt humble ſervant,

JOHN REYNOLDS.

P. S. The plants herein mentioned grew upon land, which rents at ſix ſhillings per acre.

I Should be glad of a few graſs-ſeeds, to make trial of; in caſe any can be obtained different from the North American black, &c. Timothy: the firſt I have; the ſecond I believe is of little worth. Mr. Gordon will direct them to me.

May 13, 1763.

My LORDS and GENTLEMEN,

PURSUANT to your intimation *, I tranſmit to you an account of all my proceedings relating to the plant, called TURNEP-ROOTED CABBAGE; but, before I enter on the ſubject, give me leave to acquaint you with the motives, which induced me to make trial of this plant. When I found, that there was a premium offered by your moſt laudable Society for cultivating this plant †, I began to think, that there muſt be ſome more than ordinary quality inherent in it,

* The preceding letter wa referred, by the Society, to the Committee of Agriculture: and the ſubject of it appearing a matter worthy the moſt ſerious attention, they deſired Mr. Reynolds to give the fulleſt information, he could, with reſpect to the culture, &c. of this plant; and, eſpecially, as to ſome particular points ſpecified: which he has here accordingly done.

† Mr. Reynolds does not here mean the plant, which is the ſubject of his letter: as it was never brought in queſtion before the Society till by himſelf; but the ſpecies called the turnep-cabbage, that is commonly known: and for which the Society have offered premiums ever ſince the

it, which you were deſirous of introducing to public view; and rendering ſubſervient to public good. This put me upon trying what I could make of it. But, at my firſt ſetting out, I laboured under difficulties. No ſeed could be had in England *, neither from ſeedſmen, nor gardeners: as far as I could find. They all ſaid, that it was not worth the propagating. Recourſe was then had to a noted ſeedſman in Holland for the beſt ſort of turnep-cabbage ſeed, to the amount of

the year 1765 incluſive. That kind is a very different plant from that of Mr. Reynolds: not producing a turnep-root, but only a bunch or enlargement of the main ſtalk, ſome inches above the ground: which, a little reſembling a turnep in form, occaſioned the plant's being called the *turnep-cabbage*. The other for diſtinction, therefore, is properly named the CABBAGE-ROOTED TURNEP; or may, for brevity, be called the CABBAGE-TURNEP: which will ſufficiently diſtinguiſh it from the turnep-cabbage.

* Mr. Reynolds might have been ſupplied with whatever quantity he could want of this ſeed in England, if he had known where to apply for it, Mr. Sheilds near Lambeth, having then a ſufficient ſtock. But the ſame difficulty has occurred to many others, as well as to Mr. Reynolds, in obtaining this, and other ſeeds, for which the Society have offered premiums. This has been a great impediment to the ſucceſs of their premiums. But it is now removed by their giving notice in their premium books, and advertiſements, "That the trees, "plants, cuttings, and ſeeds, for which they offer pre-"miums, may be had of Mr. Sheilds nurſeryman at "Lambeth: who has undertaken to ſupply the ſame "good, and on reaſonable terms." Mr. Sheilds, in purſuance of this agreement, contracted with Mr. Reynolds for taking part of the ſeed of this new kind of cabbage, or turnep, raiſed by him; and is prepared to anſwer any orders for it.

ſix pounds. But he was able to procure me only one Dutch pound; and ſaid, it was the growth of Ruſſia; and that both the Swedes and Ruſſians gave aſſurances of its ſtanding the froſt, in thoſe * ſevere climes. This gave me great encouragement to proceed.

CULTURE of the GROUND, and MANNER of RAISING the PLANTS.

A piece of ground, conſiſting of a gentle hazle mould, ſixteen perches in quantity, was, accordingly, long before made ready, by three good plowings. This land was ſtirred again on receiving of the ſeed; which made a fourth plowing. The ſeeds were ſown on the 15th April 1767. As there was room allotted for the growth, there was no neceſſity for planting out till the weather was ſuitable for the purpoſe. The plants could not, in this caſe, draw, and ſpoil one another, according to the gardener's term. It may be neceſſary, that I ſhould mention in this place, what the ſtate of the field was, in the year before the plants were tranſplanted into it. Two acres of it had been a fallow; two acres in oats: and one in rye; the

* The Dutch gardener informed Mr. Reynolds very rightly, that this ſpecies of cabbage, or turnep, is cultivated both in Sweden, and Ruſſia, as it is alſo in Denmark, and the ſouthern parts of Europe; where it ſtands the extremity of the ſeaſon, and is therefore, in that light, preferable to other turneps in thoſe countries.

whole piece conſiſting of five acres. In order to ſee, what effect dunging would have thereon, a certain part of this field was thick folded with ſheep's dung: the fold paſſing quite through the whole field length-wiſe; by which means it covered part of every different ſoil. The other parts were left unfolded. This was done, in order to ſee the different effects, the dung might have one way, or the other, upon each ſoil. The field, choſen for my purpoſe, had in it different ſoils, intermixed with each other, viz. clay or brick-earth, ſtrong cledge, flint gravel, or ſtony ground, gentle loam, hazle mould, and a ſmall patch of crumbly chalk. It was of a very irregular figure; ſurrounded by woods; and of courſe well ſheltered from cold winds.

Knowing, that all the cabbage tribe required deep earth to root in, I cauſed three acres to be plowed of different depths, viz. ten, twelve, and thirteen inches. This was done quite through the whole field length-wiſe; by which means, the plough paſſed through all the different ſoils in one furrow, thick and thin: oats, rye, and fallow, all together. The other two acres had only common plowings. This was performed about the middle of December 1766.

The ſecond plowing [illegible] croſs-wiſe; which we call balkir[illegible]m uſed for ſtriking furrows of a good depth, ten rows

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to the rod. This was performed January 1767. The third plowing was done in the ſame manner, towards the end of March, 1767. This, we call ſplitting of balks. Previous to this laſt, the balks were harrowed down dry. The fourth, and laſt plowing was towards the end of the May following, lengthwiſe, exactly of the ſame depth with the firſt plowing. In this manner, were the plowings, which were performed dry, compleated; and thus did the land lye till within two or three days of planting. Then it was well dreſſed: a term uſed for harrowing and rolling, that the ground might be ſufficiently fine to receive the plants. This ſhould be performed ſooner, if the weather be ſuitable: leſt it ſhould prove too dry at the time of tranſplanting.

TIME and MANNER of PLANTING.

We began to tranſplant at the latter end of June, 1767. This was performed in rows acroſs the field: ſome at two feet intervals; ſome at two feet two inches; and others at two feet four inches.

In the firſt, the plants were two feet apart in the rows: in the ſecond, they were twenty-two inches: and in the third, they were in general twenty inches: but ſome few were two feet, and others eighteen inches. Four acres were planted in this manner: and, by way of trial, we planted alſo ſeveral rows of

of common cabbage; two ſorts of brocoli, ſavoys, and Siberian borecole, commonly called Scotch kale. Theſe, with ſome coleworts ſown in the broad-caſt-way, compleated the field. The plantings were performed, as faſt as the plants advanced in bigneſs; ſo that a few days intervened betwixt the ſeveral times. Yet the whole was finiſhed before the end of July. Frequent ſhowers often followed; and all grew to admiration. But a little time diſcovered, that we had only a ſmall ſprinkle of the common turnep-cabbage, among the whole: not more than one hundred plants per acre, one with the other, throughout the plantations.

This ſomewhat alarmed me: but finding, however, that I had got a new ſpecies of plants, which neither myſelf, nor even the moſt ſkilful in the knowledge of plants knew any thing of; and liking their countenance; I treated them in the beſt manner I could. The common cabbage, the two brocolis, the ſavoys, and Siberian borecole, together with the ſprinkle of common turnep-cabbage, were all treated alike with theſe new gueſts: ſave only, that the former were planted further apart. Mark the event! None but the borecole, and theſe new comers ſurvived the froſt. Every individual plant beſides was deſtroyed thereby. An inſtance this, of the ſuperiority of this new ſpecies over the other ſorts: particularly in its being

ing impenetrable by froſt. But to proceed. We made uſe of a trowel for the purpoſe of planting, inſtead of a dibble, or dipper (a model of which will be ſent). This inſtrument, penetrated eaſily into the ground, the depth required: the planter then pulled the earth after him; and placed the plant, up to the foot-ſtalk of the leaves, behind the trowel, in a ſloping poſture, towards the mark in the line, which was made uſe of for planting, before the trowel was drawn out of the ground. The plant being thus placed, the planter then trod the earth cloſe with his foot: whence the ground by hard preſſure ſunk a little lower than the ſurface: whereby it was enabled to receive the rain more effectually at its roots.

Two men worked at one line: which was marked at the diſtance deſigned for the arrangement of the plants. A number of plants ſufficient for one row were laid at each end, by the drawer of them. The planters dropped the plants at the marks, till they met at the middle of the line. Then returned back: planting at the ſame time: and each man getting at the end of the line together, they removed it to the required diſtance; and ſo proceeded. The ſtones, clods, or bits of chalk, were bruſhed away, with the trowel at the mark: ſo that none of them, nor any dry earth entered the ground with the plant. This method, I have found

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to be far the beſt of any in planting of the cabbage tribe; and madder too.

In a ſhort time after the planting, the hand-hoe was applied to the plants in the rows; which nouriſhed them greatly. The horſe-hoe was made uſe of for the intervals, three ſeveral times; according as the weeds advanced. The laſt hoeing was in February laſt. The earthing them up gradually by horſe-hoeing proved to be very uſeful; as they became thereby well ſcreened againſt the froſts. This, likewiſe, prevented any ill effects from the crows, and rooks: which are great enemies to this plant, by picking holes therein; and occaſioning, thereby, a decay and rottenneſs. I ſhould obſerve, that I made uſe of two kinds of horſe-hoes: a prong, and a plate-hoe. The former was about fifteen inches wide, for the firſt hoeing; and the latter about a foot. Both were made to fit one and the ſame wood-work. The hand-hoe was ſix inches and an half wide. One horſe and man hoed four acres in a day. I mean the intervals only: for the hand-hoe did the reſt, as occaſion required.

Different Product.

THE effects were, that thoſe plants, which were on the clay, or brick-earth ſoil, did not turn out to be ſo good by one half as ſome of the other; nay, they were the worſt

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in all the field.—Thoſe on the ſtiff cledgey land were but little better: they weighed ſomething more than the other.—The ſtony, flint gravel, gartle-loam, and hazle-mould, were but little different from each other. I give the preference to the latter. The plants on one perch, indifferently choſen, where the deep plowing was performed, being taken up, the 15th of February, weighed two hundred and fifty-four pounds: another taken in the ſame manner on the 26th of March, weighed three hundred and ninety-three pounds. A third taken from the ſame ground, on the 27th of April, weighed four hundred and ſeventy-ſix pounds. The number of plants, which produced theſe, were ſixty-eight, and no more. Yet thoſe on the crumbly ſoil exceeded this by four pounds: the weight being four hundred and eighty pounds: and the number of plants the ſame, viz. ſixty-eight: a vaſt return, notwithſtanding I ſee my error in conſuming them too ſoon. For what were taken up in February, would now maintain twice as much ſtock, as they did at that time: as they are, this 13th May, as good as ever. Whereas turneps grow ſticky, when going to ſeed; theſe do not. My ſheep ſpoil none; but eat them up, both root, and branch, with great gladneſs of heart. A circumſtance of no ſmall weight is, their thriving beſt on dry ground: inaſmuch as they are better fed off on ſuch ſoils,

than on thoſe that are cold and wet. For my part, I, in ſhort, know not which to admire moſt, the wiſdom, or the goodneſs, of Providence, in the formation of it.

In order to gain as much experience as poſſible, in the cultivation of theſe roots, I prepared an acre in another piece of ground: on a ſmall part of which was laid two cart-loads of good dung, and mould mixed together: which was ſpread, as is uſually done for corn, before the firſt plowing. Here the plowings were performed, in the ſame manner as in the five acres, at twelve inches deep. After this, two cart-loads more of the ſame dung were laid on at another place, on the ſurface of theſe plowings: the ſoil being poor, thin, and chalky. Beſides that it never had had any manure whatever, within my memory, but what it had from theſe deep plowings only. There we planted, at two feet intervals, and eighteen inches apart in the rows. I made this trial, merely through curioſity: not expecting the leaſt advantage thereby. Yet, to my great ſurprize, the growth on this poor ground was every where alike: no diſtinction could be made betwixt that with the dung and mould, and what was not dunged either way. And, what is more extraordinary, the produce of this, when taken up, was equal to that of any one acre in the other field: one perch of it weighing, on the 15th of February, two hundred and eighty-four

four pounds. A ſpecimen of this, after it had been twice eaten off by lambs, was ſent to Mr. Gordon, ſeedſman, in Fenchurch-Street, for the inſpection of the gentlemen belonging to your Society: as a proof of the utility of this plant: and as a proof likewiſe, that no dung is required in cultivating it; and that deep plowing, or tillage, only is ſufficient. The horned cattle are fond of the herbage of this plant. They may be eaten off more than once, if required. We are now, this 13th day of May, feeding off half an acre, with ſix milk-cows and a bull, the ſecond time, in the five-acre piece: which was eaten off all the winter by the game. We find the milk, and butter, exceeding ſweet, and good. If full grown ſheep be put in, before they are deſigned to be totally conſumed, they fall immediately upon the roots: which will occaſion them to rot. But lambs will not do the ſame. We eat off with them, after weaning, half the acre in the chalky ſoil, twice; firſt in November, 1767; and a ſecond time in January, 1768: at a time when the weather was very ſevere. Theſe two feedings were made by way of trial, to ſee what effects it would have, both on the lambs, and the growth of the plants. The lambs throve very well; and liked their entertainment. Further, in order to try, whether, or not, ſheep would live upon theſe roots only, without any additional food, I fenced

fenced off half an acre, in this ſame field, which had been eaten off, once before, by lambs: viz. in December, 1767. I turned in one hundred and eighty-three ſheep, in February, 1768; but took them out every night to fold, that they might not touch the roots with dung; nor ſpoil any by lying among them, &c. Here they were maintained fourteen days in great plenty. Nothing more was given them, beſides theſe roots: and I never wiſh to ſee them thrive better. Had they been fed upon turneps, the ſheep would have required hay, ſtraw, or ſome other herbage beſides. This I deem no inconſiderable ſaving. Happy event, that ſuch good food; and that in great plenty; can, by induſtry, be extracted from ſoils, where little or nothing could be expected; and, let me add, at a ſeaſon of the greateſt ſcarcity!

In order to the conſuming them, they were dug up occaſionally with a four-prong fork. My ſhepherd took up, in three or four hours, enough to maintain two hundred and fifty ſheep for a whole day. When ſpent on the ground, they may be ſliced, if required, and uſed in the ſtalls for horned cattle, &c. I have reſerved ſome for ſeed: which have been twice horſe-hoed this ſpring: viz. in February, and April. They make a moſt delightful appearance at this time: but when the ſeed will ripen I cannot yet judge. I am apt to believe in July. Should the ſeaſon prove kind-

ly, I hope to have a conſiderable quantity of ſeed to diſpoſe of: beſides what I ſhall want for my own uſe.

REMARKS.

It is not neceſſary to be very nice about, or pay a particular regard to ſoil for the turnep-rooted cabbages, as they will grow on poor lands as well, if not better than on ſuch as are wet, ſtrong, and ſtiff: and that too, without any ſort of dung, or manure whatever, provided the plowings be duly performed. Dry lands, or ſuch as may be made ſo, are moſt likely to ſucceed. Yet, let it be obſerved, that the laſt ſummer was uncommonly wet: which might greatly favour the poor, dry, land; and injure the ſtiff, cold, and cledgy.

The ten inch plowings were equal to thoſe of twelve and thirteen on every ſoil in the field; except the flint gravel, and crumbly chalk: on theſe two ſoils the plants were beſt, where the deeper plowings of twelve and thirteen inches were performed. But the common plowings throughout the whole piece, did not produce, one with the other, more than two thirds of what the deep plowed grounds amounted to. Hence the neceſſity of plowing deep, in order to cultivate this plant ſucceſsfully; as common plowing will not do.

The foldings in this field ſeem to be uſeleſs:

leſs: no marks appearing from the dung in the leaſt degree: the unfolded parts being equal to thoſe that were folded. Whence, I conclude, that deep plowings only are ſufficient without dung: for ſo I call folding, tho' not in the higheſt degree. The greateſt weight of food was on the two foot intervals, with eighteen inches in the rows. This diſtance is, therefore, recommended. If the plants be nearer, there will not be proper room for the horſe-hoe: on which, much of the ſucceſs depends.

The ground, we ſee, may be ſtocked in winter as occaſion requires. I do not adviſe this. The owner is to uſe his own diſcretion. The five-acre piece eat off by the wood animals, points out what might be done in time of diſtreſs; which might not otherwiſe have been known. Maiming a vegetable certainly checks its growth. I find the ſeedling plants, in their natural ſtate, much ſuperior to the others, that were eaten off.

The winter herbage will undoubtedly pay the expences of planting. The feeding of the lambs on the chalky ſoil, proves to be worth at leaſt fifteen ſhillings per acre.

That the plants keep improving daily, from the time of planting, to the time of ſpencing them, is demonſtrable in both fields. The weight being near double, the 27th of April, to what it was the 15th of February, a circumſtance this, duly to be regarded.

As the flies will be apt to fall upon and deſtroy the young ſeed-plants, to prevent the great inconvenience thereof, uſe the following remedy. Mix the intended ſeed with long-top raddiſh-ſeed; which the flies much admire. The raddiſh leaves being quick growers, will entertain theſe inſects until the other ſeed plants get out of the way. But if they are very numerous, run a light roller over them night and morning, whilſt the dew remains. This will lick moſt of them up, if duly performed. For a little moiſture cauſes both them, and the earth, when clammy, to ſtick to the roller; by which means the enemy will be removed; and the young plants no ways injured thereby. A large field will require two or three rollers to perform this effectually. The ſmalleſt ſhould be not leſs than twelve inches in diameter. I have had three rollers going all night, from eight or nine, to five or ſix o'clock next morning; and this repeated for three, nights ſucceſſively, and once for four. This was in the year 1739; a year fatal to turneps. By theſe two methods, I ſaved all my growth, when there were ſcarce any field turneps beſides in Kent. What was ſtill more remarkable, that ſame year the French loſt their crops, likewiſe, in the ſame manner: and I ſold to them great quantities, the winter following.

There is, ſays a wiſe king, "that which "is deſtroyed for want of underſtanding."

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This may be applied to the common method of raiſing, and managing turneps. It certainly is a great fault to have turnep-ground, when finiſhed, rolled down: a common practice this, but very injurious to theſe young ſeed-plants. Becauſe the clods, and pieces of earth are very uſeful in ſcreening the plants from the ſun; and in quickening of their growth to a very great degree. It is well known, by the ſkilful, that ſhade promotes the growth of theſe young plants the moſt of any thing, in the firſt ſtage of life. For when they are expoſed to the ſcorching heat of the ſun, at this ſeaſon, they make little or no progreſs: ſo that if the flies ſeize them, they are ſoon gone, a firſt, ſecond, and third time, unleſs friendly ſhowers come to their relief. But when they remain, on the other hand, unrolled; they will be ten or twelve days growing, before they are fully expoſed to the ſun's heat; or riſe above the ſurface of the earth. By this means they gain much more ſtrength to ſtruggle with the enemy: and there is thrice as much food for the flies, as in thoſe of the above ſtinted growth. Should rolling moreover become neceſſary, in either caſe, as ſoon as the flies appear, the unrolled ground will have infinitely the advantage of the rolled, in admitting of the deſtroying them. Becauſe being rough, the roller, in paſſing over the flies the firſt time, will, by breaking the clods in pieces, and

by tumbling the earth about them, both bury and cruſh, as well as lick up, much the greateſt part of theſe inſects: and the raddiſh-tops will maintain thoſe that remain, as long as is needful. This is almoſt ſelf-evident, did not experience confirm it: and, therefore, an article well worthy of regard.

N. B. One pound of raddiſh-ſeed is ſufficient for ten or twelve pounds of turneps. But cabbage, and colliflowers require more, eſpecially the latter. I never ſaw the premium for deſtroying the flies in turneps till too late. Elſe I ſhould have become a candidate. What good that has brought forth, I have not learnt. I truſt, what is now offered, as well as my other ſmall efforts, will have its due weight with Gentlemen of ſuch diſtinguiſhed judgment and benevolence, as this honourable Society is compoſed of. That your truly patriotic deſigns, and endeavours, may be ever attended with all imaginable ſucceſs, is the hearty wiſh of,

My Lords, and Gentlemen,

Yours, &c.

Adiſham, May 13, 1768. JOHN REYNOLDS.

As I am little known in the world, nor yet to the Society of Arts, &c. it may not be improper to refer you for an atteſtation of the above-mentioned truths, either to the Rev. Dr.

Dr. Walwyn, prebendary of Canterbury, and rector of our pariſh; or to Mr. Lucas, his curate.

ADDITIONAL REMARKS.

The borecole, although much inferior to the turnep-rooted cabbage, is by no means to be deſpiſed. It may be made uſeful in feeding of cattle, when ſown in the broad-caſt manner, after a crop of peaſe, or fallow-plowings; as tufneps and cole-ſeed are managed. But ſhould be hoed out properly: and, ſeeing it withſtood the ſeverity of the froſt, it becomes the more valuable on that account: more eſpecially, as it falls in late for uſe, after turneps are ſpent, and gone.

This hint may not be, perhaps, uſeleſs, though foreign to the inquiries.

WORTHY SIR, Adiſham, May 17, 1768.

HEREBY you will receive my anſwers to ſuch matters as have been required by the honourable Society of Arts, &c. on your letter of the 21ſt of April laſt, concerning the manner and method of propagating, and cultivating, the turnep-rooted cabbage, &c. together with ſome other uſeful inſtructions, which I hope will be acceptable, knowing their utility. The particulars of them are ſet forth in the incloſed ſheets: which, I truſt, will prove very beneficial in

in the end, both to my brother farmers, and the whole community, when known.

And although I have been as conciſe as the nature of the thing will admit of; yet this has drawn the account to ſuch a length, that it may be deemed rather a hiſtory, or treatiſe, than a letter. Nevertheleſs, I hope the ſubſtance will be acceptable, and ſatisfactory, as to all thoſe particular things ſought after, relating to the turnep-rooted cabbage.

You will ſee, on peruſing the ſheets, under the Article of *Feeding Cattle*, that no time has been loſt in giving you a more early account of theſe plants. Becauſe they are not all yet conſumed. We are now feeding them off with milch-cows, in order to ſee what effects this plant may have on the milk and butter of ſuch cattle: a very eſſential thing. The knowledge of the utility of it, with reſpect to other horned cattle has, indeed, been obtained long before, viz. in the winter, with very agreeable circumſtances: and now I can affirm the ſame of theſe. No one can deſire either better milk, or butter, than the herbage of theſe excellent plants have produced, for theſe ten days paſt, and both in plenty too. Herein I do rejoice.

Be aſſured, that I have given a plain, ſimple, fair account, in the ſheets before you, of all my whole proceedings with the ſtricteſt regard to truth; and ſuch perſons as are inclined to propagate this plant, may ſafely depend

pend on them, if they be followed: and no doubt the ſucceſs, will be anſwerable to their expectations, if experience can warrant any ſuch thing.

I have ſent a few more of theſe roots for further inſpection of the Society, viz. thoſe we are now ſpending with milch-cows; and ſuch as ſtand for ſeed in their natural ſtate; to the end the curious may ſee the whole fruits of my work; and be fully convinced of its utility: than which, none can do more.

Beſides another motive induces me, to ſend theſe ſpecimens too.—There are ſome marks (or freſh ſhoots) on the root of this plant, that leads me to think, they are more than annuals. For the buds, and long fangy roots ſeem to point out a longer duration than one year.—Here let connoiſſeurs judge.—A little time will diſcover this.

Whatever has dropped from me, relating to this plant; or to the better management, and preſervation of the turneps, culture, &c. that the Society thinks may be of ſervice to the public, is totally devoted to their ſervice (under proper corrections) to do whatſoever they ſhall think meet. It never was my deſign, they ſhould be kept in obſcurity. For I know of no better ſervice, that I can do my countrymen, than that of pointing out better ways, and means, for procuring

us more plenty of bread: the which, I pray God to grant, Amen.

I am, Sir,

Truly, your humble ſervant,

JOHN REYNOLDS.

May 14th.

Mr. Reynolds's compliments to Mr. Box, deſires his acceptance of a bit of butter (churned yeſterday) made only from the herbage of my turnep-rooted cabbage, which I flatter myſelf will be acceptable, as a curioſity: being, I dare ſay, the firſt ever made in England from this plant, or perhaps in Europe. The two pieces are deſigned, one for your own table, and the other for the Gentlemen of the Society, as a ſpecimen to be produced with thoſe plants coming up; which I hope you will receive on Tueſday next, with an anſwer to your letter of the 21ſt of April.

Upwards of twenty pounds of this ſame butter was this day at Canterbury market: and all that have taſted it (which are not a few) think it exceeding good.—But two or three days may, and often do, make a difference in freſh butter.—Such are the fruits of my labour. I deſire Dr. Templeman may taſte it, if you pleaſe.

I am, Sir,

Your friend, and humble ſervant,

JOHN REYNOLDS.

ARTI-

ARTICLE X.

Farther Obſervations on the general Nature of the TURNEP-ROOTED-CABBAGE; *and its Uſes, as well as an eſculent Plant valuable for the Table, as for the paſturage of Cattle.*

THE plant, of which an account of the culture and utility is given in the preceding article, by Mr. Reynolds, is, according to its botanical characters, a *braſſica*; under which, as a name of the genus, the various ſpecies of the cabbages and turneps are promiſcuouſly placed by Linnæus, and the modern botaniſts; as agreeing with each other, according to his ſyſtem of the claſſes of plants. In the oeconomical conſideration of them, however, cabbages and turneps carry a notorious diſtinction. As they differ in appearance: and the root of the one, and the herbage of the other, are eaten. The great affinity, which the root of this kind of braſſica in queſtion, has with the turnep, in relation to form, conſiſtence, and flavour; as well as aptitude to the ſame uſes; may, therefore, make it be deemed, in that light, rather a turnep, than a cabbage: the root being the principal part, which is likely to prove of utility with us, as a ſubſtitute for the common turnep. This plant is, however, com-

pre-

prehended in the fifth ſpecies of *braſſica*, or the *braſſica radice cauleſcente tereti carnoſa. (Engliſh ſea cabbage)* by Linnæus, in his *Species Plantarum*; and it is enumerated there, among the varieties of that ſpecies, by the diſtinction of *braſſica radice napiformi*: Tournefort. Whether it be an original production of the braſſica genus, with a turnep-like root; and, conſequently, properly itſelf a ſpecies; or whether a ſeminal variety of the ſea-cabbage; is, nevertheleſs, not clear. It is cultivated very extenſively; and appears conſtantly to preſerve the peculiarity of its orbicular root: whereas ſeminal varieties ſport, to uſe the gardener's phraſe; and are apt to run again into their original ſtate.

This kind of cabbage with a turnep-root, therefore, though its appearance be novel here, is well known to botaniſts. It is noted, and deſcribed in ſeveral of the more minute of the former writers on the ſpecies of plants. It is called the *rapo-braſſica*, by Gaſper Bauhin: and the *braſſica radice napiformi*, by Tournefort; who thus deſcribes it:

"It has a root much like a turnep, very "fibrous, and hairy; ſo that it may be ſaid "to be bearded, on account of its many and "ſmall fibres. It frequently has a fibre "thicker than a man's thumb, yet ſtill the "main, and original root, is more tuberous, "and larger; and thus reſembles a turnep. "From this root riſes a ſtalk, a cubit and an

"half

" half high, ſmooth, round, and branched " into ſeveral arms. The leaves, at the root, " with their oblong foot-ſtalks, are a palm " long, like the ſea-cabbage; roundiſh, and " cut into deep jaggs. But thoſe, which riſe " from the ſtalks, are oblong, narrow, ſinuat- " ed, and without foot-ſtalks. The flowers " are large, and yellow; and of a deeper " colour than thoſe of the common kind of " cabbage: ſtanding upon long foot-ſtalks, " ſpringing from a ſtalk above a palm high; " and not ranged in any regular order. To " theſe ſucceed narrow cods, an inch long."

" It grows in the colder parts of Bavaria: " but eſpecially on the mountains; and about " Bohemia. The root may be eaten: and " ſome dreſs it like colliflowers. The " poorer ſort of people cut it ſmall: as they " do turneps."

The deſcription here given is not very accurate. But this kind of braſſica may, nevertheleſs, be eaſily diſtinguiſhed by it, from any other. The root is apt to run into a greater number of large ramifications than ſeems here intimated; by the mention of one only. It has generally ſeveral; and not ſolely one ſuch ramification, or fibre, as it is here called, which are thicker than a man's thumb, at their inſertion. It may be added, that the roots are alſo, larger than thoſe of the common turnep: and that, in taſte, and conſiſtence, it is very like the kernel of the cocoa nut:

being

being much firmer, more oily, and leſs ſucculent, than the common turnep.

This kind of cabbage, or turnep, has either never before been brought into England, or at moſt has been very little diſperſed. It ſeems wholly unknown to Mr. Miller, by his failing to diſtinguiſh it in his dictionary from the common turnep cabbage. In his enumeration of the ſpecies of the braſſica, he introduces one under the name of *braſſica radice cauleſcente orbiculari foliis ſeſſilibus*: to which, he ſubjoins the Engliſh name of turnep-rooted cabbage. Theſe names would ſeem to have relation to the true turnep-rooted cabbage, though Mr. Miller meant really the common turnep-cabbage; that has not an orbicular root, but an orbicular bunch or enlargement of the main ſtalk near the root, but above the ground; which, ſomewhat reſembling a turnep, has occaſioned the name of turnep-cabbage to be given to the plant. That this, and not the kind with the turnep-root, was ſolely what Mr. Miller had in view by his turnep-rooted cabbage, is clear from a paſſage, that occurs in his ſpeaking of it: where he ſays, that "it is the globular part of the ſtalk, which is eaten." But notwithſtanding this only was the kind, on which, he beſtowed the title of *braſſica radice cauleſcente orbiculari foliis ſeſſilibus*, he added, as a ſynonim, the name of *braſſica radice napiformi*, Tournefort Inſt. R. H.

210: which, as appears from the above deſcription cited from Tournefort, is a different plant, in this view of ſpecification. And indeed Tournefort has noted the other, or the common turnep-cabbage diſtinctly, under the name of *braſſica cogylode*, and *braſſica caule rapum gerens*, Dod. Pempt. and ſays, "the mark by "which it is diſtinguiſhed from all the reſt, "is this, that the ſtalk, under the leaves, is "ſhort, and ſwells to a bunch like a turnep." It may be reaſonably concluded therefore, that Mr. Miller never ſaw this kind with the turnep-root, from his not diſtinguiſhing it from the other, but confounding them together in the names, as well Engliſh as Latin: nor, on an extenſive enquiry, do I find any other perſon, who has met with it in England before. The Dutch gardener, to whom Mr. Reynolds applied, as is mentioned, in the foregoing article, for the ſeed of the common turnep-cabbage, was not better acquainted with the diſtinction of the two kinds; and ſent over the ſeed of the turnep-rooted cabbage, inſtead of the other. He ſaid, it was of the growth of Ruſſia: which may be very true: as this plant is cultivated there, and, indeed, in all the very northern parts of Europe for uſe. But he need not have ſent ſo far as Ruſſia for it. Since the plant is very common in Holſtein, and other neighbouring parts of Germany, for the table. It is, however, more extraordinary, that this parcel of

ſeed

ſeed ſhould be mixed with a proportion of the common turnep-cabbage: which would not fare ſo well in the keen froſts of Ruſſia. As all the plants of it raiſed from this ſeed were killed by the cold of laſt winter. That kind, though in ſome uſe formerly, as an eſculant plant, is very little cultivated any where now, but as a curioſity: except what has been produced lately for feeding cattle, in Ireland, and here, as above mentioned.

Mr. Reynolds, therefore, juſtly claims to be the firſt, who raiſed the true turnep-rooted-cabbage; or, as it may be called, for ſhortneſs, CABBAGE-TURNEP, in England. It is very fortunate for the public, the ſeed of it fell accidentally into his hands. As his induſtrious care of the young plants, when he perceived them to be ſtrangers; and his intelligent and ingenious management of them, in order to diſcover the beſt method of cultivation, and the utility of their ſpecies in agriculture, will be the occaſion of rendering the matter beneficial to our country, in a much quicker, and more extenſive way, than could have happened from the ordinary courſe of proceeding. This holds particularly good of the ſagacious experiments, by which he attempted to apply the principles of the new huſbandry, to the cultivation of the plant, and ſubſtitute tillage for manure. As he has demonſtrated thence, that the expence of manure may be ſpared; and that more

rately

rately deep plowing, earthing the roots, and horſe-hoeing, will be ſufficient to produce the moſt copious crop of this plant. His application to the Society, by preſenting them with an accurate and full account of his experiments, and the reſult of them, was not leſs judicious; and will doubtleſs be a very great means of promulging the knowledge of, and exciting an attention to, this momentous acquiſition, as it at preſent appears to be.

The turnep-rooted cabbage, nevertheleſs, though ſo much a ſtranger in England, is very well known in the northern parts of Germany; and in Ruſſia, Sweden, Denmark, and moſt probably all the North. If it had no other excellence to recommend it, the experience of its hardineſs would of courſe have eſtabliſhed its uſe there preferably to the other kind of turneps: which muſt, in thoſe countries, be either taken up at the end of the autumn, or be deſtroyed by the froſt. As its effects on them is ſo certain, that the particular degree of cold, according to Farenheit's thermometer, is ſtated; which is found, on the ceſſation of the froſt, conſtantly to reduce them to a mucilaginous pulp. This may be eaſily accounted for, by the action of freezing: which expanding the aqueous parts, [illegible] ſo much abound in the turnep, muſt burſt, and tear up all the vaſcular fibres; and wholly deſtroy the vegetative œconomy. The turnep-rooted cabbage, on the other

hand, bears the moſt intenſe froſt, and admits of being cultivated in very high latitudes. A gentleman of diſtinguiſhed knowledge in Natural Hiſtory, who was a native of a part of Sweden, that lies in 66° latitude, on the confines of Lapland, declares, that this kind of turnep was commonly cultivated there; and ſuffered no injuries from the cold. He informed me, alſo, that this kind was preferred in Sweden to any other turnep for the table. It is extraordinary, that a plant, with ſuch valuable qualities, ſo well known in the neighbouring countries, ſhould not have made its way here ſooner. But the acquiſition of it now, and the manner of its being obtained, is a ſtriking inſtance of the benefits that will ariſe to mankind in general, and particularly to our own country, by that inquiſitiveneſs after new ſubjects and modes of culture, and ſpirit of reſearch after improvements, which the preſent times poſſeſs; and which has been greatly promoted by the example and influence of the Society for the Encouragement of Arts, &c. Indeed, this diſcovery was immediately owing to an attempt in purſuit of one of the views of that Society, by an intended candidate.

It is not the great hardineſs only, [illegible] the turnep-rooted cabbage particularly, to the purpoſes of huſbandry. The retaining its full plumpneſs, and ſoundneſs, even till it be run to ſeed, a quality in which the common turnep

turnep is wholly deficient, renders it capable of affording a ſupply of food for cattle, at the end of the ſpring, when turneps would fail: which, in unfavourable ſeaſons, when fodder is dear, muſt be productive of very conſiderable advantages. Mr. Reynolds has experienced this: and writes, in a private letter, "I am "unable ſtill to ſay of what duration this "plant is. For I find, though it is now "July the 8th, the roots are making freſh "ſhoots daily, in thoſe plants lately cut for "the ſeed: and withal, ſeem as firm and "ſound as ever. A marvellous plant, in-"deed! and truly worthy cultivating, be aſ-"ſured, in every reſpect, whether for the "table, or cattle." Mr. Reynolds will, indeed, ſeem to have juſt ground for his admiration of this plant, if we make juſt allowance for the contents of the following extract from another of his letters, dated June 17: "I have the pleaſure to ſay, that I have raiſ-"ed, this laſt April, plants in number ſuffi-"cient for ſix acres, or more: one half of "which is already planted; and the remains "will ſoon be ſo, as the weather is now fa-"vourable. I make no doubt but the ſow-"ing in July will ſucceed very well. For "[illegible]y be got and planted by Bartholo-"m[illegible]day, no doubt; and theſe will come "in when moſt wanted, in March and "April, for feeding ſtock: and there is no "better food for cattle under the ſun, nor

" any one plant, which has been yet known,
" that will produce ſuch an immenſe quan-
" tity of food as this I am treating of: which
" no farmer ſhould be without, that has it in
" his power to raiſe it. I could ſay more in
" praiſe of its utility, were it neceſſary; but
" let what has been ſaid ſuffice.

" N. B. My deſign is to plant fifteen acres
" more, as ſoon as the peaſe are off: which
" will make the whole I ſhall have planted,
" twenty-one acres complete.

" One particular, not mentioned in my
" letters to the Society, is very remarkable.
" The laſt half acre ſpent, in the five-acre
" field, although eaten off all the winter long,
" produced, at leaſt, ſeventeen tons of food in
" May: and maintained ſix milch cows, one
" heifer, and one bull, ſixteen days on the
" herbage only. The roots afterward kept
" one hundred and ſixty-two tegs (ſheep a
" year old) twenty-five days; all in the ut-
" moſt plenty. Was ever any thing like this
" introduced before, think you?"

This crop, amounting to thirty-four tons per acre, is certainly very large, compared to the product of moſt other plants. But the turnep-rooted cabbage, cultivated on land more ſuitable to it than that on which Mr. Reynolds raiſed this quantity, which, according to his own account, was only worth ſix ſhillings an acre, though in Kent, will yield a much greater. According to his own relation of their ſize, and the ſpe-

cimens

cimens he ſent to the Society, the roots of his plants were not near ſo large as they have been found on the ſoils that are moſt fit for them: and the reaſon is evident; as his ground, though of various qualities, was too ſtiff or hard for them. They require a looſe earth, ſuch as would be proper for carrots, as the tap-like ramifications of the root ſtrike a conſiderable length downwards, where they meet with ſmall reſiſtance; and ſupply more nutrition to the body of the root. A ſandy ſoil, therefore, if not poor, would be beſt.

On the whole, this plant muſt be eſteemed a very valuable acquiſition to huſbandry. The reſiſtance to all froſts, and even ſuch moiſture as will deſtroy the common turnep; — the duration throughout the whole year; — the admitting of being raiſed on ground not rich, and without manure; — and the greatneſs of the produce, with its wholeſome and nutritive quality; — combine to render this plant far ſuperior to any of thoſe raiſed annually for feeding cattle in the winter, and ſpring; and adequate to the idea of the Socity for the Encouragement of Arts, &c. with reſpect to the *winter pabulum* for cattle; which they ſo aſſiduouſly and earneſtly ſought after.

As to the merit of the turnep-rooted cabbage for the table, the roots are eaten, and admired in the Northern countries. But, perhaps, in ours, where we have greater varieties of vegetables in gardens, and are thence more de-

licate, it may be thought inferior to the common turneps. But, to make amends, the herbage in the winter and ſpring, is excellent. Mr. Reynolds ſays, in one of his letters, "As an eſculent plant, I can affirm its ſtalks "and leaves to be little inferior to broccoli; "and may be cut much oftener: and there- "fore worthy the gardener's notice: the "more, as being impenetrable by froſt."

It may, perhaps, be thought ſome diminution of the value of this plant in huſbandry, that it requires, according to Mr. Reynolds's example in the culture of it, to be tranſplanted: which not only enhances the expence, but creates a dependance on favourable weather. His conduct in this point does not, however, eſtabliſh the practice of tranſplanting to be neceſſary. As it was not the effect of experience, but, in a great meaſure, of accident. He ſowed the ſeed, believing it to be the common turnep-cabbage; and when the plants were come up, and he diſcovered them not to be ſo, he proceeded to plant them out into the ground prepared for them, probaby both becauſe he ſtill imagined them to partake moſtly of the nature of cabbages; and becauſe he muſt have loſt a great part if he thinned them by hoeing; as the ſeed was raiſed on only ſixteen perches of ground. But both the manner of growth of the plant, and experience in other places, ſhew, that they may be ſown, as turneps, and hoed; or thinned

ned by hand. And this may be practicable, as well when ſown in drill, as in broad-caſt. The plants may certainly be allowed to be nearer each other alſo, than Mr. Reynolds placed them. The intervals, indeed, when ſown in drills, cannot be leſs than two feet, where horſe-hoeing is propoſed: but the plants may be cloſer in the rows than two feet; and the crop, therefore, increaſed in proportion one fourth, or perhaps one third. For this plant does not ſo far recede from the nature of the common turnep, as to require to ſtand ſingle at a conſiderable diſtance from any other, without injury to the root; though perhaps the herbage, when drawn up by the nearer approach of the plants to each other, may be leſs ſtrong and copious.

END OF VOLUME THE FIRST.

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